THE IRON TRADE REVIEW

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THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

The tendency is still toward higher prices for iron and steel—more marked in pig iron than in finished material—but the tonnage is relatively small on which the maximum prices are paid, of which a good deal is heard in certain quarters. It is sufficient commentary on the unusual conditions in the pig iron market, that producers are tempted to allow their furnaces to produce a maximum of off iron by offers of $1 to $3 a ton more than they are getting on their regular product. The situation in Southern iron has not cleared in the week. The two leading producers still quote $12, Birmingham, for No. 2 foundry, apart possibly from some Eastern business on which prevailing prices in that section are more nearly approached, and are still assuring the trade of their belief that there will be plenty of iron to go round. From a Central Western agency of one of these companies a circular was widely circulated the past week, saying that the report that the supply of Southern iron for the last half of the year is nearly exhausted, is not true so far as this company is concerned; that it would have more iron to offer which would be placed on the market as early as possible. As yet no announcement has been made that either of the two companies in question has resumed selling $12 iron. Other Southern furnaces are selling, though not heavily, for there is no large tonnage under inquiry, at $14 and $14.50, Birmingham, for No. 2. Here and there are buyers who are evidently taking on speculative tonnage, but such cases are not common; sellers prevent them where they can. Malleable interests have been steady buyers of iron and Northern furnaces have sold on a steadily rising market, as high as $19 at Central Western furnace being reported. On foundry irons Central Western furnaces have generally advanced their prices and $18.50 is now commonly quoted on No. 2, though the more conservative furnaces that think to hold the market down are selling at $17.50. Southern gray forge is generally sold on a $13 basis, Birmingham; for Northern iron $18.50, Pittsburg, has been paid. Considerable buying of basic iron is reported; for a round lot of Virginia basic $15.75 at furnace was paid. The United States Steel Corporation has had up with the merchant furnaces the matter of Bessemer iron contracts for the fourth quarter. The furnacemen are not a unit on the matter of price, but it is probable that little iron will be offered at $16, the basis of third quarter transactions. Another inquiry which has come up is for 90,000 tons of Bessemer deliverable over the coming year at the rate of about 300 tons a day. Even with the advances that have come in the recent weeks there seems to be little doing in the importation of either pig iron or steel. Thus far actual shipment of foreign iron and steel into the United States has been quite small. Furnaces and steel works are adding to their output, and the March record considerably exceeded that of February, as April is expected to show a good advance over March. As the season of open weather advances the railroad situation is likely to show steady improvement. The feature of the week in finished material was the closing up of pending business in steel bars on a Pittsburg basis of 1.50c, March making a record for bar tonnage that has never been equaled. Yet jobbing houses acted conservatively in covering at the price named, most of them keeping quite within their probable needs for the balance of the year. This spirit of caution is generally abroad in the market and there is less fear that the price situation may get beyond control. Structural material for 1903 delivery has been sold in a few cases, today's prices ruling. The importation of shapes may be a feature later, as there is little prospect of placing additional orders for 1902 delivery with domestic mills.

PITTSBURG.

(Special Telegram.)

PITTSBURG, April 2.—It is reported that the United States Steel Corporation is endeavoring to buy 100,000 tons of Bessemer iron for third quarter, but very little can be had for this delivery. An effort may be made to lease a furnace now producing foundry iron.

OFFICE OF *The Iron Trade Review*,
439 PARK BUILDING, April 2.

In both raw and finished lines the iron and steel market is somewhat quieter, a condition naturally to be expected after a period of heavy buying into the future through which the market has just passed. During the past three weeks the steel bar manufacturers of the country placed orders for fully 300,000 tons, many of the contracts of the large agricultural concerns running to July 1, 1903. Yesterday the advance of $2 per ton on steel bars became effective on all lots, and the bar situation promises to be quiet for some time, all the large buyers having covered their requirements. On the other hand the consumers of iron bars are not taking kindly to the advances made by the bar iron manufacturers and are not now placing contracts for long delivery. Owing to the wide difference in the price—4 per ton—many consumers of iron bars placed orders for steel bars and are substituting the latter wherever possible. Owing to the fact that the structural mills are practically filled up to the end of the year the structural market is also inclined to be quiet. A fair tonnage continues to be placed in plates and there is every indication that there will be considerable heavy buying in the near future, many consumers not being covered for more than two or three months. There is no movement on foot among the plate manufacturers to advance prices, despite statements to the contrary. In sheets, especially the lighter gauges, the usual spring activity is not strongly noticeable, but this is evidently the result of buying earlier in the year. The demand for merchant pipe and casing, however, is particularly strong and the buying from month to month this year is heavier than ever before.

The operation of the furnaces in the Valleys during the past month has been up to nearly the normal capacity, and the daily output exceeds that of the month of February. The coke deliveries are also getting better daily and are nearly up to the normal requirements and with better weather in view this month's output of the furnaces promises to exceed that of any month during the past half year.

One of the largest transactions of the week in the pig iron market calls for the delivery of 25,000 tons of Virginia basic iron from May 1 to the end of the year. The price paid was $15.75 at the furnace and the iron is for delivery west of Pittsburg, but owing to the location of the plant takes a lower than the Pittsburg freight rate. The United States Steel Corporaion has not yet placed its order for Bessemer for the last quarter of the year for the reason that the exact amount required has not yet been determined. The matter has been under consideration by the Bessemer Furnace Association, but no price has been made. A number of the furnace operators are in favor of asking $17 at the furnace for the fourth

quarter, and even if the conservative element prevails the price will be higher than was paid for third quarter iron. An inquiry has come into the market for about 90,000 tons of Bessemer for delivery at the rate of 300 tons per day, deliveries to extend to April, 1903. As yet the order has not been placed and the indications are that the iron cannot be secured. The foreign pig iron market continues to advance and the buying of foreign iron has fallen off almost entirely.

PIG IRON.—The buying of foundry iron is mostly limited to small lots for delivery the remainder of the first half, though we can note contracts for about 2,000 tons for delivery the third quarter. A wide range of prices prevails on No. 2, small lots for delivery the remainder of this half commanding $19, Pittsburg, while the sale of a special brand is reported at $19.50. For the third quarter we note the sale of 2,000 tons at $18.75, Pittsburg, although small lots are reported to have been contracted for delivery during this period at $19. Northern basic is held at $17.50 to $17.75, Pittsburg, and very little is being offered. Virginia furnaces with basic on hand are offering at $15.75 and $16 at the furnace, which is almost a prohibitive price for Pittsburg delivery. We note the sale of 25,000 tons of Virginia basic for delivery from May 1 to the end of the year at $15.75 at the furnace. How soon the United States Steel Corporation will come into the market for Bessemer for the fourth quarter can only be conjectered inasmuch as the tonnage required for this period has not yet been decided upon. A fair demand exists for forge iron for the third quarter, and we note the sale of 1,000 tons for this period at $18.25, Pittsburg. The outputs of not only the furnaces in the Valleys, but of the big steel plants in this district, are constantly increasing and the pig iron market promises to become somewhat easier in the very near future. In both Germany and England there have been gradual advances in pig iron until prices today as so high as to limit importations of pig iron to comparatively small amounts. Bessemer iron for delivery within the next two months commands fancy prices, and we note the sale of 500 tons for delivery within a month at $18 at the furnace. Another lot of 1,000 tons for delivery within two months was placed at $17.50 at the furnace. We revise quotations as follows:

Bessemer, Valley	$17 00 to 18 00
Bessemer, Pittsburg	17 75 to 18 75
No. 1 Foundry	18 00 to 19 25
No. 2 Foundry	17 50 to 18 50
No. 3 Foundry	17 25 to 18 00
Gray Forge, Pittsburg	17 50 to 18 50
Chilled Basic, Valley	17 00 to 17 50
Chilled Basic, Pittsburg	17 75 to 18 25

STEEL.—The transactions in domestic steel during the week have been limited to small lots for delivery the remainder of this half. We note a sale of 200 tons of Bessemer billets for delivery through April and May at $32 per ton. The demand for foreign billets and sheet bars is extremely inactive although such material is offered delivered in Pittsburg at $32 a ton and sheet bars at $33 a ton. The demand for Bessemer rods is not large, due to the fact that nearly all the consumers have their requirements covered to July 1. Small lots for immediate delivery are quoted at $36, at mill, Pittsburg.

FERRO-MANGANESE.—Quotations on domestic manganese continue unchanged, and we quote 80 per cent in carload lots, delivered at buyer's mill at $52.50 per ton. The foreign price is now somewhat above that of the domestic producers.

SPELTER.—The spelter market is again somewhat stronger than it has been for some time, and we quote prime Western grades at 4.25c to 4.27½c, Pittsburg.

MUCK BAR.—Muck iron continues strong under an advancing forge iron market. We note the sale of 200 tons for delivery to May 1 at $33.50, Pittsburg.

SKELP.—The skelp market continues strong and high prices continue to rule owing to the high price of muck bar and steel. We quote sheared iron skelp at 2.10c and grooved at 2.05c. Steel skelp is quoted at about the same prices.

RAILS AND TRACK MATERIAL.—There is little new business being placed in standard section rails. The demand for light sections however is strong. We continue the following quotations: Standard sections, 50 pounds and over, in lots of 200 tons and over, $28; car lots and less than 200 tons, $30; less than car lots, $32; light rails, 8 pounds, $45; 12 pounds, $42; 16 pounds, $39; 20 pounds, $37; 20 pounds, $35; 20 to 40 pounds, $33. Track material: Spikes, 2c to 2.05c; track bolts, square heads, 2.50c; hexagon heads, 2.65c; fish plates, 1.60c.

PLATES.—A fair tonnage continues to be placed in plates, and with a large tonnage in sight which will be placed shortly the market will be greatly strengthened. Prices remain unchanged as follows: Tank plate, ¼-inch thick and up to 100 inches in width, 1.60c at mill, Pittsburg; flange and boiler steel, 1.70c; marine, ordinary firebox, A. B. M. A. specifications, 1.80c; still bottom steel, 1.80c; locomotive firebox, not less than 2.10c, and it ranges in price to 3c. Plates more than 100 inches wide, 5 cents extra 100 pounds. Plates 3-16 of an inch in thickness, $2 extra; gauges Nos. 7 and 8, $3 extra. These quotations are based on carload lots, with 5 cents extra a hundred pounds for less than carload lots. Terms, net cash, in 30 days.

PIPES AND TUBES.—The tonnage in merchant pipe and casing is much larger than ever before for this season of the year, ahd the business placed from month to month is breaking all records. We quote the following discounts to jobbers in carload lots, Pittsburg:

MERCHANT PIPE.

	Black. Per cent.	Galv. Per cent.
⅛ to ⅜ and 11 to 12 inches	60	48
½ to 12 inches	67	55

Discounts below are to consumers in carload lots, Pittsburg:

BOILER TUBES.

Steel.

	Per cent.
1 to 1½ inches	47½
2¼ to 5 inches	65⅝
1¾ to 2¼ and 6 to 13 inches	60

Iron.

	Per cent.
1 to 1½ and 2½ inches	41½
1¾ to 2¼ inches	43
2¾ to 13 inches	53

CASING.

	S. and S. Per cent.
2 to 3 inches	58
3¼ to 4 inches	63
4½ to 12½ inches	65

BARS.—On April 1 the price of steel bars from mill for all lots was advanced to 1.60c. Iron bars are being held at 1.80c by Eastern manufacturers and one Western interest, but 1.70c is still quoted by the Republic Iron & Steel Co. We revise quotations as follows: Bessemer steel bars, 1.60c; open-hearth, 1.70c; plow beams and cultivation beams, 1.60c, net; channels, angles, zees and tees, Bessemer under three inches, 1.70c; over 3 inches, 1.80c; bar iron, 1.70c to 1.80c, Pittsburg, with full freight added to point of delivery. Hoops and bands are quoted at 1.90c, full extras; refined iron bars, 2c and upwards.

SHEETS.—Heavier sheets—those from 12 to 20 gauge—are commanding premiums for immediate deliveries. On the lighter gauges the demand has fallen off to some extent, but this is due to the heavy buying earlier in the year, and both the mills of the combine and independent manufacturers have large tonnages booked. We make the following quotations: Nos. 10 and 12, 2.40c to 2.50c; 14 and 15, 2.50c to 2.60c; 16, 2.60c; 18 and 20, 2.70c to 2.80c; 22 and 24, 2.80c to 2.90c; 26, 2.90c to 3c; 27, 3c to 3.10c; 28, 3.10c to 3.20c; 29, 3.25c to 3.35c; 30, 3.35c to 3.45c. Galvanized sheets are quoted at 70, 10 and 5 off in carload lots; less than carload lots, 70 and 10 off.

STRUCTURAL MATERIAL.—Little new business has been placed in structural material during the week. All the mills are filled up to the end of the year and considerable business is being turned down. As yet the foreign market has not been drawn upon, but there is every indication that it will be before many weeks. We make the following quotations: Beams and channels, 3 to 15 inches, 1.60c; 18 to 24 inches, 1.70c; tees, 1.65c; zees, 1.60c; angles from 3 to 6 inches, 1.60c; universal mill plates, 1.60c.

WIRE AND WIRE NAILS.—At the meeting of the wire and wire nail manufacturers' association held last week no change was made in the price of either nails or wire products, although some of the independent manufacturers favored an advance on nails of $1 per ton. The meeting of the cut nail manufacturers was postponed, but owing to the action taken by the wire nail people it is doubtful if an advance in cut nails will be made. Quotations are as follows: Wire Nails in carload lots, $2.05 per keg; smaller lots, $2.10 and $2.15; plain wire, $2 in carload lots and $2.10 in less than carload lots to retailers; galvanized wire $2.40 in carload lots; polished staples $2.20 and galvanized staples $2.60; painted barb wire $2.60 and galvanized $2.90. These prices are quoted on a Pittsburg base, plus the actual freight to destination. Cut nails are held at $2 in carload lots and $2.05 in less than carload lots, Pittsburg, plus freight to destination.

MERCHANT STEEL.—Shafting manufacturers report an immense tonnage booked and a fair amount of business is being offered so that agreed prices are being easily maintained. In the tool steel line the Colonial Steel Co., the foremost competitor in the country of the Crucible Steel Co. of America, commenced operations this week. Quotations unchanged are as follows: Turned, cold rolled and ground shafting in carload lots is quoted 50 off, and in less than carload lots, 45 off; tire steel, 1.70c in carload lots and 1.80c less than carload lots; toe calk, 2.10c to 2.25c; sleigh shoe, 2c to 2.25c; machinery steel, 1.50c; smooth machinery steel, 1.75c. Tool steel, 7 cents and upwards.

OLD MATERIAL.—The demand for heavy melting stock continues strong and open-hearth steel producers are forcing the market up on account of their anxiety to secure material. We revise quotations gross tons as follows: Heavy wrought scrap, $21 to $21.50; cast scrap, $17.25 to $17.50; iron rails, $25 to $25.50; car wheels, $19; cast borings, $9.50 to $10; wrought turnings, $13.50; steel rails, $19.25; steel rails for re-rolling purposes, $24.

COKE.—The output of the Connellsville region continues at about 215,000 tons per week and the shipments are constantly growing better. For second half delivery Connellsville furnace coke is quoted at $2.50 per ton and foundry at $3 to $3.25. Outside coke is sold at $2.25 for furnace and $2.75 to $3 for foundry.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
534 MONADNOCK BLOCK, April 1.

The unprecedented sales of bar iron and steel in the past week are the most noteworthy feature of the iron and steel trade in this city. All classes of consumers have been heavy buyers and it is estimated that upwards of 200,000 tons have been sold in the last two weeks. The active buying for 1903 delivery at this early period was due to the announcement made by mills several weeks ago that all orders above 500 tons, placed before April 1, would be accepted on the basis of 1.65c for steel, and 1.75c for iron. After today steel will be held at the minimum, 1.75c, and iron will advance to 1.95c. Practically the entire trade has covered for its wants for 1903, and it is expected that the market will be quiet for several months after April 1. This will not discourage the local mills, however, as most of them are sold up until July next year on steel, and for nearly that length of time on iron. The anticipated slump in scrap has taken place in this market and prices on all old materials have been reduced 50 cents in the past week. Railroad companies and dealers in outlying sections of the country, taking advantage of the high price prevailing in this market for some time, have been shipping in considerable material of late, and as most of the large melters were stocked up and had withdrawn from the market, a weakening in prices was not unnatural. There is little improvement to be noted in the coke supply, most of the shipments still coming from West Virginia points. In all other materials, the market is very buoyant, and prices of products from store advance as stocks diminish.

PIG IRON.—There is still an active demand for spot iron, but not much can be obtained in this market. Some dealers report they have orders for all the spot iron they can obtain, and at their own price. Inquiry for future delivery is light, melters apparently realizing that it is useless to ask for bids at the present time. A few sales have been made by Southern furnaces for delivery in the last half, on the basis of $14 Birmingham. As a general rule, however, all the furnaces are discouraging buying except in cases where old customers are concerned and where the iron is urgently needed. There is no basis on which to figure the price of spot iron. It varies according to the exigencies of the situation. The quotations below are for prompt delivery:

Lake Sup. Charcoal	$21 00 to $22 00	Southern Coke No 4	$15 65 to $15 90
Local Coke Fdy. No. 1	19 00 to 19 50	Southern No 1 Soft	17 65 to 18 15
Local Coke Fdy. No 2	18 50 to 19 00	Southern No. 2 Soft	17 15 to 17 65
Local Coke Fdy. No. 3	17 50 to 18 00	Southern Gray Forge	15 65 to 15 40
Local ScotchFdy.No.1	19 00 to 19 50	So thern Silveries	17 65 to 18 15
Local ScotchFdy.No.2	18 50 to 19 00	Jackson Co. Silveries	19 00 to 19 60
Southern Coke No. 1	17 65 to 18 15	Ohio StrongSofteners	18 50 to 19 00
Southern Coke No. 2	17 15 to 17 65	Alabama Car Wheel	20 50 to 21 00
Southern Coke No. 3	16 65 to 17 15	Malleable Bessemer	19 00 to 19 50

BARS.—The last week in the time limit set by mills, during which orders for not less than 500 tons and more would be booked on the basis of 1.75c for iron and 1.65c for steel, was phenomenally active. It is estimated sales in the past two weeks aggregated 200,000 tons. All classes of consumers bought heavily for their wants in 1903, and it is expected that the demand for these materials will be quiet for several months. After this date, iron will sell at 1.95c, and steel 1.75c. No concessions from these prices will be made whatever the order may be. Some of the local mills will be out of the market for the entire year on steel, and for at least nine months on iron, as a result of the heavy buying of the last few weeks. We quote iron, 1.95c Chicago; steel, 1.75c Chicago; 2c to 2.10c.

SHEETS.—Demand for both black and galvanized sheets has improved considerably in the past week, and a good buying movement is looked for by some dealers. Most of the exception of carload orders now and again, little business is being diverted to these concerns. Shipments from Pittsburg are improving. We quote No. 27 black, mill shipments, 3.15 to 3.20c, Chicago; galvanized, 70 and 10 per cent to 70, 10 and 2½ per cent, plus freight. Out of store, No. 27 black, 3.45c to 3.50c, and galvanized, 70 per cent to 70 and 2½ per cent.

STRUCTURAL STEEL.—A heavy demand for material from Chicago stock has caused prices on all shapes and sizes to be advanced to 3 cents and cartage charges. This demand is increasing, and there will be further advances as stocks gradually diminish. We quote mill shipments, carload lots, as follows: Beams, 15 inches and under, 1.75c; 18 inches and over, 1.85c; angles, 6x6 and under, 1.75c; over 6x6, 1.85c; plates, 1.75c; base, tees, 1.80c; zees, 1.75c; lots from store, angles, 3c, minimum; tees, 3c, minimum; beams and channels, 3c, minimum.

RAILS AND TRACK SUPPLIES.—Some further inquiry is reported, but little or no business is transacted on account of the mills being full of work for so far ahead. Light rails out of store have been advanced in the past week. We quote as follows: Standard rails, $28; light sections, $36 to $38, according to size; out of store, $45.00 to $50.00; splice bars, 2c; spikes, 2.30c; track bolts and hexagon nuts, 3.10c to 3.20c; out of store, 3.30c; square nuts, base, 2.85c; out of store, 2.95c.

BILLETS.—Business in this line is quiet, and inquiry is limited to small lots, largely because the supply is almost entirely cut off. We quote Bessemer billets, $38 a ton, open-hearth, $40.

MERCHANT STEEL.—Still further large contracts with the implement manufacturing trade are reported. This buying movement will probably continue for several weeks, or until the trade has covered for next year's wants. We quote mill shipments, Chicago delivery, as follows: Smooth finished tire steel, 1.95c to 2c; open-hearth spring steel, 2.45c to 2.60c; sleigh shoe, 1.65c to 1.80c, flat sizes; concave and convex, 2c; out of store, 2.15c; cutter shoe, 2.40c to 2.60c; machinery steel, 2.15c to 2.25c, base; plow steel, 2.50c and upwards, according to quality; toe calk, 2.25c to 2.35c; out of stock, 2.40c to 2.60c; ordinary tool steel, 6c to 7c; specials, 13c and upwards; less than carload lots, 5 per cent to 10 per cent higher; cold rolled shafting, carload lots, 50 per cent off, Chicago; less than carload lots, 45 per cent off, Chicago.

MERCHANT PIPE.—The recent advance in the price of pipe has resulted in a slight falling off in new business, but for this time of the year all manufacturers report trade as very good. We quote as follows:

MERCHANT PIPE, RANDOM LENGTHS.

	Black Per cent.	Galv. Per cent.
⅛ to ⅜ in.	56½	44½
¼ to 12 in.	63½	51½

BOILER TUBES.

	Steel Per cent.	Iron Per cent.
1 to 1½ in.	40	35
1¾ to 2½ in.	47½	37½
2¾ to 5 in.	57½	47½
6 in. and larger	45	40

PLATES.—An active demand is reported by the local interest, and contracts and specifications have been coming in freely. Jobbers report a like condition of trade, with the prospects of still heavier buying as the spring advances. We quote as follows, Chicago delivery: Tank steel, base, ¼-inch, 1.80c to 1.85c; flange steel, 1.90c to 2c; marine steel, 1.95c to 2.10c; fire box steel, ordinary, 2c to 2.10c; special, 2.25c and upward. Jobbers are selling from store according to size as follows: Tank steel, 2c to 2.10c; flange steel, 2.25c to 2.35c.

CAST IRON PIPE.—Prices on the basis of Chicago delivery,

have been advanced $1 a ton for all sizes of pipe. An excellent demand is reported, the orders for small lots being most numerous. We quote as follows: 4-inch water pipe, $30, carload lots, f. o. b., Chicago; 6-inch water pipe, $29; 8-inch and larger sizes, $28; gas pipe, $1.00 a ton higher than above prices.

WIRE AND WIRE NAILS.—Manufacturers report they are unable to accumulate any stock owing to the heavy demand for all kinds of wire products. Business from Iowa and from parts of the Northwest has been heavier this year than for many years past; in fact, this section of the country has contributed more largely to the phenomenal demand than has any other portion tributary to Chicago. Deliveries on nails and smooth wire are fairly prompt. It has been rumored for a time that the local interest might advance prices, but it was definitely decided last week not to do so. We quote as follows: Smooth wire, carload lots, $2.15; painted barb wire, $2.75; galvanized barb wire, in carload lots, $3.05; wire nails, carload lots, $2.20; staples, carload lots, $2.30; jobbers' prices to retailers, 10 cents higher than above for carload lots, and 20 cents for less than carloads.

COKE.—West Virginia coke continues to be more plentiful than that from Connellsville, and is commanding from $5.50 to $6 a ton for spot delivery. The local receipts remain far from meeting the requirements, and shippers do not anticipate much improvement for some time.

OLD MATERIAL.—Prices on all materials have fallen 50 cents in the past week. This slump was not unexpected as the large melters withdrew from the market some weeks ago owing to the high prices that have prevailed for some time. Railroads and country dealers have aided in bringing the reduction about sooner than it was expected by shipping large quantities of scrap during the mild weather of the past week. We quote as follows:

Old iron rails	$22 50 to $23 00	Relaying rails	$27 00 to $28 00
Old steel rails, 5 ft. and up	22 50 to 23 00	Old wheels	17 00 to 17 50
Old steel rails, mixed	16 00 to 16 50	Heavy melting steel	15 00 to 15 50
		Mixed country steel	10 50 to 11 00

The following are selling prices per net ton:

No. 1 R. R. wrought	$18 00 to $18 50	Steel axles	$18 00 to $18 50
No. 2 R. R. wrought	15 50 to 16 00	Cast borings	6 50 to 7 00
Dealers' forge	13 50 to 14 00	Wrought turnings	12 00 to 12 50
No. 1 busheling	12 50 to 13 00	Iron axle turnings	13 00 to 13 50
No. 1 R. R. & mch. cast	13 00 to 13 50	Steel axle turnings	12 00 to 12 50
Railway Malleable	12 50 to 13 00	Stove plates	10 00 to 10 50
Country malleable	11 50 to 12 00	Old iron splice bars	18 00 to 18 50
Iron axles	21 50 to 22 00		

CLEVELAND.

OFFICE OF *The Iron Trade Review*, 1064 ROSE BUILDING, April 2.

It is reported that 500,000 tons of additional ore have been placed at 75 cents from the head of the lake on season charters. Vesselmen have been skeptical of the statement that 1,300,000 tons were placed at this rate early in March and have been on a hunt for the boats. There may be a larger proportion of ore than usual reserved for wild chartering. Whether it will finally be 75-cent or 80-cent business will depend upon the earliness or lateness of the opening. Vessels are already preparing to go to the head of the lakes. Sales of ore continue to be made in a small way on the basis of the opening prices, no advances having been asked corresponding to the advances in pig iron which have come meantime.

PIG IRON.—Foundry iron continues to advance, with a rather wide spread still existing between the highest and the lowest prices asked. The minimum for No. 2 foundry for delivery in the second half is $17 at Valley furnace. We have heard of sales with deliveries beginning in July as high as $18.25 and $18.50 at furnace for No. 2, while higher prices are secured where the furnace is able to squeeze in a little iron for second quarter delivery. All furnaces are behind their schedules and consumers are occasionally put to hardship by shortness of iron as well as coke, though actual shut downs of foundries have been rare. Fourth quarter sales of Bessemer have been discussed between the associated merchant furnaces and the United States Steel Corporation, but nothing definite has been done. It is expected the offerings to the steel corporation will be lighter than heretofore as many furnaces now tied up on contracts are being offered $2 a ton over contract prices for all the off iron they may make. Southern Ohio furnaces are reported to be doing business on a basis of $18.50 at furnace for No. 2, an advance of 50 cents to $1 in ten days. Southern furnaces that have sold in this market in the week have received $14 and $14.50, Birmingham. A sale of Southern gray forge has been made at $16.75 in the Valley, or $13 at furnace. Northern forge is $17.25 to $17.50 at Valley furnace, with very little to be had. We revise quotations as follows:

Bessemer	$17 75 to $18 75	Scotch No. 1	$18 00 to $19 50
No. 1 Strong F'dry	18 00 to 19 50	Scotch No. 2	17 75 to 18 75
No. 2 Strong F'dry	17 75 to 18 75	Gray forge, Valley	17 50 to 17 75
No. 3 Foundry	17 50 to 18 50	LakeSuperior charc'l	21 00 to 22 00

FINISHED MATERIAL.—The passing of April 1 brought the booking of large contracts for bars, nearly all steel. It is believed that 30,000 to 35,000 tons were booked in Cleveland offices the past week jobbers, bolt and nut manufacturers and implement firms being chief buyers. Yet there was evidence of conservatism in the buying, most of it being for the remainder of this year, with some running to April 1, 1903, while in the Chicago market the bulk of the March business ran to July 1 of next year. Steel bars are now 1.60c, Pittsburg, as a minimum in any quantity. Bar iron is quoted 1.80c, Pittsburg, by one interest and 1.70c by another, but little is being booked at 1.80c. Cleveland store business is still at 1.90c, but an advance to 2c is expected. Structural steel from jobbers' stocks is now quoted at 2½c minimum. Some mills are not now making new sales to holders of stocks for re-sale, but are restricting their dealings to consumers. Occasionally an inquiry calling for shipment in 1903 comes up and all such business is booked at current prices. The merchant pipe trade shows signs of spring demand. The two recent advances seem not to have held back business. In iron pipe particularly the higher price of skelp has called for advances in the finished product. Sheet mills are evidently booking more than they ship out. Prices have held steady and promise to be well maintaned in view of the high priced raw material of independent producers, for the time being. We quote as follows on ordinary lots to consumers for Cleveland deliveries: No. 24, 2.90c to 3c; No. 26, 3c to 3.10c; No. 27, 3.10c to 3.20c, with extras for less than carload lots, etc. Store quotations range as follows, quantity and delivery determining the exact price: No. 10, 2.35c to 2.50c; No. 12, 2.45c to 2.60c; No. 14, 2.55c to 2.70c; No. 16, 2.95c to 3.10c; No. 18, 3c to 3.15c; No. 20, 3.05c to 3.20c; Nos. 22-24, 3.15c to 3.30c; Nos. 25-26, 3.25c to 3.40c; No. 27, 3.35c to 3.50c; No. 28, 3.45c to 3.60c. The above are for one pass through cold rolls. For full cold rolled the extra is .10c. Galvanized sheets are quoted 70 to 70 and 5 off list. The plate market promises an even keel, capacity being ample for all requirements. Shipyards are well supplied for some months to come. Boiler and tank work requirements have not been conspicuous in a long time. We continue to quote tank on a basis of 1.70c, Cleveland.

OLD MATERIAL.—The demand for scrap preserves the prices quoted a week ago, but the possibility that high water mark has been reached has occurred to some of the smaller holders who show a tendency to realize at the turn. No doubt considerable stocks have been held for the rise. Prices locally have shown no reaction so far, however, and the market is very firm. We quote for Cleveland delivery in gross tons as follows:

Old iron rails	$ 23 00 to 24 00
Old steel rails (6 ft. and over)	20 00 to 22 00
Old steel rails (6 ft. and under)	17 00 to 18 00
Old car wheels	16 00 to 18 00
No. 1 R. R. wrought scrap	21 00 to 22 00
Mill scrap	17 00 to 17 50
No. 1 machine cast scrap	15 00 to 16 00
Iron axles	26 00 to 28 00
Axle turnings	16 00 to 17 00
Wrought turnings (free from cast)	13 50 to 14 00
Cast borings	8 00 to 9 00
Uncut wrought iron boilers	11 00 to 12 00
Steel boiler plates	16 00 to 17 00
Grate bars	11 00 to 12 00
Pipes and flues (clean)	17 00 to 18 00
Tank iron	17 00 to 18 00
Hoop and band iron	13 00 to 14 00
Sheet iron	11 00 to 12 00
Wrought drillings	13 00 to 13 50
Malleable iron	17 00 to 18 00
Stove plate	12 50 to 13 50
Heavy steel	17 00 to 18 00

CINCINNATI.

April 2.

The only unsatisfactory condition in the market is the inability to get either raw or finished material for satisfactory delivery. The price of Southern pig iron is still maintained at $12 Birmingham, but there is practically no iron selling at this price. The two largest producers are out of the market for the time being, and the smaller furnaces are not selling at $12. What iron is selling is bringing all the way from $13

to $14.50 for No. 2 at Birmingham and most of it is for delivery the last two months the present year. The market for finished material is quite firm and the demand continues very good with a good deal of trouble about deliveries. The scrap iron men have advanced prices on all old material and they say that the market is almost bare of some kinds. Manufacturers are in the market for finished material and for scrap, and all lines in which iron enters as a factor are in excellent condition.

PIG IRON.—The pig iron market remains in the same peculiar situation mentioned at the last writing. The price is still maintained for Southern iron by the Tennessee Coal & Iron Co. and the Sloss-Sheffield Steel & Iron Co. at $12 for No. 2 at Birmingham and both of these concerns have been out of the market for a short time, though it is intimated that at least one of them will be in a position to sell iron beginning with the first of the month. The representative at Cincinnati of the Sloss-Sheffield Co. sent out a circular this week in which he refuted the statement that the two largest producers of Southern pig iron had sold their entire output for the balance of the year. Speaking for his company only he gives assurance that it will have more iron to offer and that in a short time. In the meantime, "adhering to the policy of the past few months the company will do all in its power to prevent any undue excitement and will endeavor to hold prices at the present basis of $12 Birmingham for No. 2 foundry." The output of the company, the circular said, will be much greater than in 1901 and the belief is expressed that consumers will not be justified in paying the heavy advance asked by some interests.

Following the sending out of this letter it is understood that a good many orders came in but that the company has not accepted them though it may be in a position to do so later on, it being expected that the meeting held the first part of this week will result in the company's getting back into the market. The smaller furnace companies are getting as high as $14.50 Birmingham for No. 2 foundry. One of the large Southern interests during the past week accepted an order for gray forge at $16 Pittsburg. A contract was placed this week for 10,000 tons of Virginia basic and another for 6,400 tons of Virginia basic. There is considerable of a demand for basic for the time at least.

It appears a good deal as if the large interests were trying to keep out of the market until a good part of the needs for the remainder of the year are covered by such producers as are willing to furnish iron at a price. It is expected that the producers will all be in the market again shortly, having accomplished their purpose of holding the market steady at $12. Operations of some Southern furnaces have been interfered with, severe rains having fallen with serious results. Prices are practically unchanged from what they were a week ago, but it is out of the question to include in the quotations given the entire range at which iron has sold. The following quotations are given:

Southern Fdy. No. 1		$15 25	to	$16 50	
" "	2	14 75	to	16 00	
" "	3	14 25	to	15 50	
" "	4	13 75	to	15 00	
So. Fdy. No. 1 soft		15 25	to	16 50	
So. Fdy. No. 1 soft		14 75	to	16 00	

Gray Forge	$13 75	to	$15 00
Northern Fdy. No. 1	17 85	to	18 75
" " 2	17 35	to	18 25
Southern C. W. iron	20 00	to	21 25
Malleable coke iron	17 60	to	18 60

FINISHED MATERIAL.—Material of all kinds is in very good demand by manufacturers and builders. Deliveries on bar iron and steel are by no means satisfactory and consumers are making general complaint. The announcement is made of an advance of $2 a ton on bar iron from 1.70c to 1.80c Pittsburg, which means a price of 1.92c Cincinnati. Bar steel is now 1.60c Pittsburg for all lots large and small the $2 concession allowed to large buyers having been withdrawn. This makes the price of steel bars at Cincinnati flat 1.72c. The change in prices makes no difference with the buying demand. Manufacturers of implements, safes and all kinds of specialties are heavy buyers and the fact that the long drawn out strike of the carriage workers in Cincinnati has been settled by the men returning to work will act as good influence on that branch of the business. The carriage workers' strike has lasted for nearly nine months and has been a most costly affair.

OLD MATERIAL.—There has been a material strengthening of the market for scrap iron and prices have advanced all around. The demand is good on account of the scarcity of pig iron for immediate or early shipment. On account of the demand for cars for the shipment of manufactured product and general merchandise, scrap is not moving to market as it would otherwise. There have been no large transactions reported but it is understood some buyers have been after considerable lots of railroad scrap. Prices are revised as follows:

Old No 1. Wrought Railroad, net tons	$ 18 50
Cast Machine and Foundry, net tons	13 50 to 13 75
Old Iron Rails, gross tons	23 50 to 23 75
Old Steel Rails, gross tons	24 00 to 24 25
Old Short Lengths, gross tons	16 00 to 16 25
Old Iron Axles, gross tons	23 00 to 23 25
Old Iron Car Wheels, gross tons	18 50 to 19 50
Stove Plates, gross tons	10 50 to 10 75
Wrought Turnings, net tons	13 00 to 14 00
Cast Borings, net tons	7 50 to 8 50

PHILADELPHIA.

April 1.

The second quarter of the year begins with an increased scarcity of nearly every kind of material, and in spite of all efforts being made to hold prices down these are gradually hardening. Not much relief is expected before the fall months and even then there is nothing to indicate but that every pound of material will be eagerly taken.

PIG IRON.—The buyer has found but little comfort during the week just past, as every change has meant higher values. In a general way it may be said that no market exists, as there is but very little material to be had and most of the iron which is coming forward is to fill old contracts. Were it not for the fact that most dealers have an eye to future business much higher prices would be exacted of those who are short of iron. They all know, however, that accommodating a customer, or even a new concern, at the present time, may mean much later on, when things will be going the other way. For iron which must be had this side of July transactions have been made at the following figures: No. 1 X foundry, $20 to $21; No. 2 X foundry, $19.25 to $20; No. 2 plain, $18.75 to $19; standard gray forge, $18 to $18.25; ordinary gray forge, $17.25 to $17.75; Basic (chilled), $19 to $19.50. A dollar or two less than these quotations can be done on business on which deliveries can be extended throughout the balance of the year.

FINISHED MATERIAL.—All departments are transacting a very heavy business and further advances have been made in bars and plates, although these have not so far been announced officially. Prospects for a continuance of present conditions throughout the balance of the year are very favorable and the advances which have taken place in the cost of raw materials are bound to reflect themselves in higher prices throughout the finished product. Structural material continues to be a leader as far as premiums are concerned. Nominal quotations for Philadelphia and nearby deliveries are as follows: Plates, ¼-inch and thicker, 1.85c to 1.95c; bars, steel, 1.80c to 1.85c; iron, 1.95c; angles, 1.75c to 1.85c; beams and channels, 1.75c to 1.85c.

OLD MATERIAL.—With the greatest scarcity of old material known in years it is a seller's market all the way through. As near as it is possible to ascertain the figures at which transactions are taking place these are about as follows for deliveries in buyers' yards: Choice railroad scrap, $24 to $25; ordinary light scrap, $14 to $15; machinery cast, $17 to $17.50; heavy steel scrap, $20.50 to $22; old iron rails, $24 to $26; wrought turnings, $14.50 to $15; cast borings, $9 to $10; old iron axles, $26 to $27; old steel axles, $22.50 to $23; old car wheels, $17.50 to $18.

Report that Conneaut Tube Works Project is Revived.

Dispatches from Conneaut, O., dated April 1, say that the plans for building extensive tube works there, made by the Carnegie Steel Co. over a year ago, will now be carred out by the United States Steel Corporation; that more than the $12,000,000 originally talked of will be expended. The large expenditures made in double-tracking the Bessemer & Lake Erie road and the further expenditures planned for this road are cited in confirmation of the tube mill story.

It is true that large expenditures are to be made in new construction by the National Tube Co., announcement of which will soon be made, but we are officially advised that the Conneaut dispatch as above is untrue.

The Ohio State board of arbitration was in conference with the Morgan Engineering Co. and its employes at Alliance, O., last week and it was supposed the differences were settled. However, the firm objected to taking back certain men, and as those most objectionable were union officers, the men refused to return under that condition, and the strike is still on.

THE IRON TRADE REVIEW

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APRIL 3, 1902.

MONTHLY MACHINERY NUMBER.

Beginning with the paper of today, the first issue of *The Iron Trade Review* in each month will be known as the Monthly Machinery Number. The plan is to enlarge these first-week numbers so as to give prominence to matter of special interest and value to the proprietary side of the machinery trade. This will be done, not at the expense of the other departments of the paper, which pertain to the iron and steel and the foundry trades, but in addition to the usual features of every issue of the paper. It is not the expectation that the contents of the Monthly Machinery Number shall appeal to the man in the shop. The field of shop practice on the mechanic's side and of the details of machine construction is already well covered by ably conducted journals. It has been the thought that by the method indicated the constituency of *The Iron Trade Review* among machinery manufacturers and users, which has been much increased in the past two years, would grow more rapidly, giving it eventually a place in these lines equal in prominence to its position in other departments of iron and steel working.

The proprietor, superintendent and manager of the machine shop, whose interest is in questions of administration, shop accounting, of buying and selling, of wages and labor conditions, of movements among employers and employes, will find, we are sure, matter of value in every issue of *The Iron Trade Review*, and an unusual amount of it in the Monthly Machinery Numbers. The present issue represents the minimum size of the Monthly Numbers; that there will be an increase over this from month to month is confidently expected.

IRON AND STEEL IMPORTS AND EXPORTS.

The statistics of the Treasury Department indicate that there has been much more talk than business in pig iron and steel for importation; at least, that most of the business done is in material not yet delivered. The February imports of pig iron were 8,307 tons, against 1,962 tons in February last year; of blooms, billets, and bars of steel, 2,235 gross tons, as against 600 tons in February, 1901. The inward movement of scrap, also, had not set in in February to any great extent, the total for the month being but 750 tons, against 122 tons in February last year. The total value of iron and steel imports for the month was $1,768,303, against $1,476,013 in February, 1901; for eight months ending with February the total value was $15,727,932, against $12,279,674 for the eight months ending with February, 1901.

The export statement given below bears out the story told month by month since last spring, of declining tonnage. For February, it will be seen, the total was only 50 per cent of that for February, 1901. Billets have fallen off to nothing. For the eight months ending with February last year the total was 117,634 gross tons; for the eight months ending February 28, 1902, but 2,337 tons. Steel bars and rails are conspicuous for reduced tonnage, but structural steel and wire actually show an increase:

EXPORTS OF IRON AND STEEL FROM THE UNITED STATES.

GROSS TONS.

	February.		8Mos. end'g Feb.	
	1901.	1902.	1901.	1902.
Pig Iron	9,461	2,463	242,066	47,621
Scrap	678	1,328	28,066	9,786
Bar Iron	1,845	386	15,850	6,495
Wire Rods	176	159	7,823	5,529
Steel Bars, (not Wire Rods)	2,599	1,076	69,432	12,925
Iron Rails	122	4	1,235	600
Steel Rails	23,723	6,202	222,845	138,741
Billets, Ingots and Blooms	9 015	88	117 634	2,337
Hoop Band and Scroll Iron	86	133	3,026	1,158
Iron Sheets and Plates	708	482	5,623	3,100
Steel Sheets and Plates	3,274	397	36 536	5 744
Tin Plates, Terne Plates and Taggers Tin	262	215	594	351
Structural Material	4,903	10 081	45,557	39,376
Wire	5 369	7,417	44,725	62,389
Cut Nails	331	498	6,902	4,071
Wire Nails	1,357	1,677	12 620	11,628
Other Nails, incl'd'g Tacks	151	215	1,159	1,306
Total	63,958	32,531	861,583	353,157

The total value of all iron and steel and machinery exports in February was $7,358,296, as against $7,959,218. Higher prices have made up for loss of tonnage, and in some lines of machinery the totals exceed those for the corresponding month last year. Unclassified machinery shows a total of $1,405,169, against $1,178,657 in February, 1901. Electrical machinery sent abroad in February was valued at $591,078, against $566,494; boilers and parts of engines, $109,126, against $94,462; locomotives, 35, valued at $374,007, against 60, valued at $587,314; metal working machinery, $339,753, against $217,956.

THE REMUNERATION OF SHOP LABOR.

There are employes who seem to be governed by the purpose to do the least amount of work necessary to retain the situation and at the same time leave a maximum for others to do. The main object of some employers, on the other hand, is to pay a minimum amount of wages in order that the sum thus saved may be diverted to some needy branch of the business. It is not surprising if these two classes of men should find themselves at variance continually, not only on wage matters but on every question growing out of their relations.

It is not impossible to suppose a condition of affairs where the wages could be liberal and the initial cost of the manufacturer's goods decreased. But this could only be done by raising the wages directly with the increased efficiency of the workmen. The original

form of the device for producing this change in shop conditions, both atmosphere and habits, came in the introduction of piecework—the payment of a fixed sum for the amount of work done on a certain article or machine. The piecework could be distributed to the workmen as individuals, each having a chance to improve his salary by increased effort and irrespective of the labor performed by his shop neighbors. There is another variety, however, which has had some vogue in the East and is not yet wholly extinct in large manufacturing plants. This is the contract system, the work being let out by contract to the shop men who employ their own workmen and use the employer's shop and tools as their own for the time being. This is essentially piecework for the few and day work for the many, with the all-important addition that the individual workman with the contract is now an unusually keen overseer of his day-rate assistants.

The tendency of the workman under the piecework impetus to improve the working conditions, to force himself and the lathe, for example, by an ample supply of good tools, tight belts, maximum feeds and speeds, has the result of greatly quickening the shop rate of production and the payment to labor, once meagre, now mounts rapidly to a point where the employer is apt to feel that formerly his workmen did not do justice to him. The result is usually a reduction in the wage rate and the workman thus receives a check upon his powers. One or two experiences are sufficient to teach a lesson which has a permanent effect, and any increase of the normal productive methods is not to be expected afterwards.

There are two methods of dealing with this condition and there may be variations of these systems which in the minds of many have sufficient difference to warrant a separate classification. The one known as the premium plan has been widely adopted and is referred to elsewhere in this issue of *The Iron Trade Review*. The general impression of the premium plan is that it is elastic enough to cover a wide range of industries and the percentage of premium can be easily graded to apply successfully to unskilled and skilled labor as well as that variation among craftsmen depending upon their peculiar occupations and the extent to which the relative increase in productive effort may be considered equally arduous. The increased premium earned by a blacksmith or bricklayer is gained by a greater demand upon sheer brawn and muscle than that which may be derived from the watchful forcing of a machine tool by a highly trained machinist, well supplied with free cutting and durable tools. It is here that one of the main virtues of the premium system abides and the author of the plan, Mr. F. A. Halsey, has found that in spite of this somewhat obvious advantage, but little attention has been paid to this feature.

The other plan of remunerating labor is the bonus system as applied at Bethlehem by Mr. H. L. Gantt, and is based upon the principles enunciated by Mr. F. W. Taylor in a paper read before the American Society of Mechanical Engineers on a method of elementary piece rate fixing. A card is made out showing in detail the best method of performing each of the elementary operations on any piece of work, specifying the tools to be used and setting the time for each of these operations as determined by experiment. The sum of these periods is the total time needed to complete that piece of work. If the man follows his instructions with all the work assigned to him, as constituting his proper task for the day, he is paid a definite bonus in addition to the day-rate whih he always gets. The foremen also receive, in addition to their day wages, compensation proportional to the number of their men who earn a bonus and an extra compensation if all their men earn bonuses. While this system may not be strictly termed piecework, yet it is intended that the compensation shall be quite large for the maximum amount of work obtained and quite small for anything less than this amount. It will be readily understood that the extra bonus received by the foremen, when all their men perform the maximum amount of work, is a strong inducement to make them teach their inferior men.

The latter system of wage remuneration has not yet been so fully tried in various lines of the industrial world as has the older premium plan, but some excellent results are claimed for it and the method is of course preferable to either the day rate or the average piecework systems. How far it is comparable with the premium plan at its best only a longer experience will decide. Both have been introduced by capable shop managers with no other object than the harmonizing of the interests of employer and employed, and while neither is claimed to be the only good and perfect method, both have in skillful hands produced remarkable results. With a greater scope it can reasonably be expected that the better will survive and do something in its extended usefulness to bring about a more cordial co-operation between the men who pay wages and those who earn them.

Stove Molders Get Five Per Cent Advance.

Members of the Iron Molders' union of North America working in stove foundries represented in the Stove Founders' National Defense Association, will receive a 5 per cent increase in wages through an agreement reached March 29 at Chicago between representatives of the association and the union. A demand for a 10 per cent increase in wages was presented to the employers, but they declared themselves unable to grant it, and a compromise was made on 5 per cent after a two days' conference. This makes a total of 20 per cent in advances in this trade since 1898.

Obituary.

Joseph Forker, a pioneer iron manufacturer, coal mine owner and banker, of the Shenango Valley, died on March 19, aged 73 years. He was a son of General John Forker. He was connected with many of the early manufacturing concerns of Mercer County and for 30 years was a director and for much of that time president of the Spearman Iron Co. He is survived by one son, D. M. Forker, furnace superintendent and district treasurer of the Republic Iron & Steel Co., at Birmingham, Ala. H. P. Forker, secretary of the Sharon Tin Plate Co., Sharon, Pa., is a nephew.

Lester M. Biggs, head of the Biggs Boiler Co., of Akron, O., died of heart disease March 31. He was connected in the eighties with the McNeil Boiler Works, of Akron, but later organized a company in which he had control.

The Pittsburg Gage & Supply Co., Pittsburg, announces that it has added to its business a contracting engineering department under the direction of A. K. Ashworth, and is now prepared to contract for the installation of complete power equipments, consisting of engines, boilers, pumps, heaters, steam piping and accessories, and power transmission machinery outfits of any horsepower.

The Pittsburg offices of L. & R. Wister & Co., Stuart B. Marshall resident manager, have been removed from 331 Fourth avenue to 507 and 508 Frick building.

The Basic Process for the "Independent" Producer.

To the Editor:

I question if there is anything in the iron and steel business today that has attracted as much attention and has been discussed more than the remarkable condition of the market, so far as raw material for steel making is concerned. In looking back over the last 25 years we find a condition where iron and steel scrap was almost a drug on the market. As the years rolled on and the production of steel increased and this steel began to come back in the shape of scrap to the mills that were making their product from iron scrap objection was made to the use of steel scrap because it would not do to mix it with the iron. Indeed, at one time scrap was so plentiful, could be bought at such a low figure and was so hard to dispose of that it accumulated all over the country. This went to such an extent that some people actually believed the day would come when we would have enough scrap to re-work—if a proper method could be discovered—to keep us going without the aid of pig iron. Of course this was far-fetched, but it only goes to show the condition of things at that time, so far as the scrap question was concerned.

The introduction of the Seimens open-hearth furnace, which was first done on a large scale in this country by the Carnegie Steel Co., and the wonderful growth of the open-hearth steel industry during the last ten years, have brought about such a state of affairs, so far as scrap is concerned, that today its cost is greater than the cost of pig iron.

From time to time the question has arisen as to which can be produced the cheaper, Bessemer steel under the pneumatic process or open-hearth steel under the basic process. Judging from results, notably what has been done in the direction of extending open-hearth steel practice, the millions of money have been expended in additions to existing plants, and any new enterprises that have taken life during the past ten years have adopted the open-hearth process, which, of itself would tend to prove that it can be produced more cheaply than Bessemer steel. In fact, it has been acknowledged openly that the point was passed some time ago at which Bessemer steel could be produced as low as open-hearth steel. While it may be true that under the Bessemer process a given number of tons per 24 hours can be produced at a less cost than open-hearth so far as the coal or fuel is concerned, there is this offset: while it is good practice to obtain 90 per cent of ingots out of 100 per cent of raw material in the case of Bessemer, 95 per cent of ingots can be obtained in the open-hearth process, which of itself shows quite a saving.

The scarcity and the high price of scrap at the present time have raised a hue and cry against basic open-hearth practice. In the writer's opinion there is undue and false alarm as to the seriousness of this situation in comparison to the seriousness of the present situation so far as the scarcity of raw material of all kinds is concerned. There is a scarcity of everything; hence why specialize on scrap?

The question whether or not—even should the existing conditions exist permanently—it is wise for those who are at present contemplating making their own steel to put in the Bessemer process instead of the open-hearth process, should appear very clearly settled in the minds of those who are at all familiar with the manufacture of both processes, and that in favor of open-hearth. In the manufacture of Bessemer steel it is seldom wise to use more than 10 per cent of scrap and they must always use a pig iron commonly called Bessemer pig, which contains a certain low proportion of phosphorus. In the manufacture of open-hearth steel 70 per cent of scrap can be used and 30 per cent of pig iron, which can be high in phosphorus, or the entire charge can be pig iron. Again, among the scrap that we find around us there are thousands upon thousands of tons of cast iron scrap which can be taken in the open-hearth process as a substitute for pig iron. This cannot be done under the Bessemer process.

Another reason in favor of the open-hearth process—especially for those who are considering putting in small or moderate sized plants—is this: All or nearly all of the Bessemer ore deposits have been secured by those whose interest it is not to sell but to use this ore themselves. And at the rate at which Bessemer pig is now being used in this country, many of our large manufacturers can figure within the lifetime of the present generation that all the Bessemer ore will be used up. This cannot be said of what is called high phosphorus ore. Iron ore above the Bessemer limit in phosphorus can be found in large quantities in the majority of the states of the Union; and scrap is like the poor, it is "always with us."

Another point in connection with the probable future supply of scrap is this: All the scrap that we are using to-day, let it be from the turnings of the machine shop all up the grade to old steel rails or heavy steel scrap, was at one time manufactured in this country either at the forge, foundry or rolling mill. It may be said that all shapes of material in iron and steel, at one time or another will come back to us, with the exception of fine wire that is drawn and woven in wire cloth, or wire made into pins, or fence wire. To these add nails and tin-plate. The balance, which consists of by far the majority in tons, is bound to come back to us at one period or another. True, it is hard to determine at what period, but they will come back at some period. Material used in buildings will no doubt be the slowest to appear on the market as scrap; but large as the tonnage may be in structural steel, yet, by taking out all that is mentioned above and all the structural steel, I do not believe it will amount to 2,000,000 tons per year at the present.

Let us assume a period ten or fifteen years after which the material rolled or made during a given year will come back to us in the shape of scrap. Then what do we find, assuming the period to be ten years—which is more against my argument than if we used the term of years as fifteen? Ten years ago a little over 5,000,000 tons of rolled iron and steel included everything made in this country. We will say that we are today receiving in scrap material the tonnage made at that time. If we look forward ten years on the same basis and imagine the scrap that will be available, and admit that all iron and steel made this year, with the exception of some articles as named above, comes back to us in the shape of scrap, what do we find? We find that last year 12,500,000 tons of steel alone was made in this country, to which it would be safe to add over a million tons of bar iron. Then in ten years from this time we will have proportionately that much more scrap to expect.

No one can dispute the logic of this argument; the only question of difference that can arise being the exact period at which the material rolled today will be returned as scrap. No wonder that we all thought that Holley spoke in a prophetic strain when he said that the open-hearth steel furnace would be at the funeral of the Bessemer converter. Since his death every year has made his prophecy more likely to become a true one.

The marvelous increase in the production of steel during the past two years, and this more in the line of the open-hearth process than the Bessemer or any other steel manufacturing process, is hard to conceive. And what the result will be when all the new plants now in the course of construction and contemplation are in operation, is harder to tell, if the demand does not keep up with the supply, and one might think madness prevails in this direction. Yet when we come to analyze the matter closely we will find that there is a method in their madness.

Let us take, for instance, a company which by industry, thrift and ingenuity has established a world-wide reputation for the excellence of its goods. We will say that their raw material in this instance is wire rods. Prior to the consolidation which was finally merged in the United States Steel Corporation, this concern bought rods at somewhere between $5 and $6 above the price of 4 inch billets. We find that about a year ago, after the United States Steel Corporation had been in existence for some time, the difference in the cost of the 4-inch billet and wire rods (in Pittsburg) was $12 per ton. What more natural for this wire company than to put up a rod mill to make its own rods, reasoning as follows:

"Heretofore we have bought our rods at $6 per ton above the price of the 4-inch billet, and to-day we are called upon to pay the difference of $12 per ton above the price of the 4-inch billet. We can put up our own rod mill and if we operate it for a year at the price we are paying for rods we would earn enough money to pay for our rod mill and at the end of that time we will have our own rod mill and the money back that we expend for it."

This is no fancy sketch; this has actually been done upon several occasions. We find today that there is only $5 per ton difference between the price of 4-inch billets and wire rods in Pittsburg. But, whereas before the consolidation 4-inch billets were easily bought and obtainable in the open market at not more than $6 per ton above the price of pig iron, today we find that 4-inch billets cannot be obtained for less than $13.50 above the price of Bessemer pig. The increase of the price between the 4-inch billet and wire rod drove the consumer of wire rods to put up a rod mill and buy his billets to make his rods. And so the increased cost today between pig iron and 4-inch billets is going to compel those who are now buying their 4-inch billets to put up a small open-hearth steel works of their own, irrespective of the price of scrap at the present time, because this difference of $13.50 is between the price of pig iron and the present price of the 4-inch billet.

It might be said that the next move on the part of the United States Steel Corporation will be to reduce the margin of profit between pig iron and the steel billet. But the small consumer reasons thus: Last year, 1901, a banner year as to output, with prices higher than they have been on an average for five years previous, this vast consolidation, on its own showing, did not make 10 per cent on its capital stock, calling common stock part of same. Yet a great many independent concerns manufacturing iron and steel outside of these vast consolidations have shown for the year 1901 more than 100 per cent on their investment. So, if any man operating on a small scale, gets well established in business before the demand ceases to a considerable extent, he can produce material and sell it at a profit at a time when the United States Steel Corporation and other large corporations who have watered their stock will not be able to pay dividends. This may be poohpoohed at and ridiculed, and it may be claimed that special advantages accrue to the United States Steel Corporation and others owning their own raw material, having their own ships to transport their ore, having coal fields and their own coke ovens, blast furnaces and machinery of the most modern type. But with all that, owing to the extent to which the corporation's stock has been watered it will be compelled to keep up the price of the finished material in order to pay not only dividends, but expenses, to a point where the small producer will still make a handsome profit.

With what complacency can the small steel manufacturers observe the recent stock and bond proposal of the big corporation in connection with providing funds for improvements and extensions, while the former in many cases not only made enough money in the year to pay for plant erected a year ago but acquired a fund for further extensions, besides paying a handsome dividend.

Surely the way of the independent manufacturer of today is cast in pleasant places. WM GARRETT.

Cleveland, O., March 29.

Portsmouth Steel Company.

(Special Telegram.)

PITTSBURG, April 2.—The Portsmouth Steel Co., Portsmouth, O., has been incorporated under the laws of West Virginia with $300,000 capital. The incorporators are A. F. Baumgarten, T. A. Watkins, G. R. Wallace, B. H. Hirshfield, W. L. Glessner, N. E. Whitaker and F. H. Glass. This company recently purchased the Burgess mill of the Crucible Steel Co. of America, at Portsmouth, as exclusively noted in these columns last week. The steel plant will be placed in operation in about a month and two additional open-hearth furnaces are to be built.

New Castle Steel Plant Active.

(Special Telegram.)

PITTSBURG, Pa., April 2.—The steel plant of the National Steel Co. at New Castle, Pa., which has been under repairs for a number of weeks, was started up on April 1. New converters have been installed and other improvements made which increase the daily capacity from 1,000 to 1,600 tons of steel.

The Bourne-Fuller Co., Cleveland, dealer in iron, steel and pig iron, announces the removal of its general offices on April 1, to the eighth floor of the Hickox building, corner of Euclid avenue and Erie street. The change gives much increased facilities.

PERSONAL.

John R. Stevens, formerly employed by the Carnegie Steel Co., Pittsburg, has accepted a position as superintendent of one of the departments of the British Westinghouse Co., Manchester, Eng.

Reuben Miller, treasurer of the Crucible Steel Co. of America, Pittsburg, returned from a trip to the South last week.

William Hamilton has been appointed superintendent of the recently purchased foundry of the Newport News Shipbuilding Dry Dock Co., Newport News, Va.

H. B. Shields, whose retirement as manager of the Girard Iron Co., Girard, O., was noted last week, will reside hereafter at Natchez, Miss., where he will have charge of the development of large lumber interests. J. A. Kennedy, superintendent of the Girard furnace under Mr. Shields, has been appointed the latter's successor.

Samuel R. Callaway, president of the American Locomotive Co., accompanied by President Loree, of the Baltimore & Ohio Railroad, left for an extended Mexican tour last week.

John Molamphy, superintendent of labor and transportation of the Homestead Works of the Carnegie Steel Co., Homestead, Pa., has resigned after many years of active and meritorious service. He will be succeeded by John Lawler, who will take charge of the transportation department, and A. W. Kline, who will be placed in charge of the department of labor.

A delegation of six officers of the Rapid Transit Subway Construction Co., of New York, visited Pittsburg last week for the purpose of looking after the execution of large machinery contracts which have been placed with Pittsburg concerns. The party consisted of E. P. Bryan, general manager; S. L. F. Deyo, chief engineer; John von Vleck, mechanical engineer; G. B. Stilwell, electrical director; George Gibbs, consulting engineer, and W. S. Gibson, secretary.

John Fritz, of Bethlehem, Pa., sails this week for a trip abroad, returning late in May.

Willard Fuller, of Cleveland, blast furnace manager at Emma Furnace, Cleveland, for a number of years and later at Lorain and Sparrow's Point, is president and general manager of the Ohio Steam Generator Co., recently organized in Cleveland.

Andrew Carnegie has in preparation a book entitled "The Empire of Business," which is soon to be published.

The Steel Corporation Bond Issue.

At a meeting in New York April 1 the directors of the United States Steel Corporation formally approved the conversion plan under which it is proposed to retire preferred stock to the amount of $200,000,000, upon which dividends are paid at the rate of 7 per cent per annum, and issue bonds to a total of $250,000,000, with interest fixed at 5 per cent. May 19 was fixed as the date upon which the project will be submitted to the shareholders.

The directors also issued a statement showing that the earnings of the corporation for the first year of its existence, which ended on March 31, with the last month estimated, reached a total of $111,067,195, being as follows by months: April, 1901, $7,356,744; May, 9,612,349; June, $9,394,747; July, $9,580,151; August, $9,810,880; September, $9,272,812; October, $12,205,774; November, $9,795,841; December, $7,758,298; January, 1902, $8,901,016; February, 1902, $7,678,583; March, 1902 (estimated), $9,700,000. The statement said: "The net earnings were arrived at after deducting, each month, the cost of ordinary repairs, renewals, and maintenance of plants." Of the net earnings sinking funds on bonds and depreciation and reserve funds claimed $15,399,695; interest on bonds, $15,200,000; and dividends, $56,017,783, while the undivided earnings were $24,449,717.

Judge E. H. Gary, chairman of the board, stated that the extra $50,000,000 of bonds above the $200,000,000 to be used for retirement of preferred stock would give the corporation a working capital of about $106,000,000 to be used in any way that the directors might deem best. He would not say that this implied the acquisition of any new plants. No preferred stock is to be retired without the consent of the holder.

The LaBelle Iron Works, of Steubenville, O., will make further additions to their tube mill.

The Machinery and Metal Working Trades—News Letters from Selling Centers.

Like the iron market the machinery market is beset on every hand with evidences of prosperity. The number of plants operated at night as well as by day, with all the added expense of night-time production, is probably greater than at any other time in the country's history. One year ago prices of iron and steel and of machinists' supplies were lower than today, yet the consensus of opinion is that the prosperous condition of machinery manufacturing plants is to all appearances no nearer the inevitable interruption than it was one year ago. Machinery responds slowly to changes in general values and is influenced but little by the fluctuations in iron and steel. But the supply market gives signs of some feverishness. Merchant pipe and boiler tubes have advanced twice in the past six weeks. The bolt and nut manufacturers and the chain manufacturers put up prices last week, and merchant steel and shafting have shown a very strong market. The possibility that all material may advance as spring demand develops is already being discussed. Structural material, which must now be obtained largely from second hands, is advancing, and builders' hardware and plumbers' supplies are on a high basis. Last year building was stimulated by conservative prices. The question is apt to come up to the man who proposes to build now whether the price movement is not swinging close to the high point and whether another year may bring a more favorable time for his investment.

So far as machinery is concerned it matters little in what line inquiry is made. There will be an almost unvarying story of an exceedingly heavy demand, coming apparently from every quarter. The enlargement of facilities by foundries and machine shops is going on on a scale betokening faith that prosperity will still be in full swing when the added capacity is finished. Whether in engines and boilers, in electrical equipment, in heavy tools for railroad shops, agricultural works, forge shops, shipyards or steel foundries, or in lighter machine tools for metal working shops in a score of lines—the pressure of work and inability to meet contract time of delivery is a well nigh universal report.

Foreign trade is relatively light. With some manufacturers export orders continue on a par with last year's. In general there is the feeling that this trade will not come to the machinery manufacturer's aid as it did six or seven years ago, the next time the home demand shall shrink. But generally the pace is so rapid that trouble is not being borrowed. In the letters below some idea is given of conditions as they exist at leading machinery centers:

CHICAGO AND THE WEST.

CHICAGO, April 1.—The machinery trade in the West, so far from slackening, in view of the prevailing high prices and scarcity of raw material, seems to receive increased impetus. South Canal street, which is the pulse of the machinery trade in the West, reports increased activity in all lines, particularly in the smaller kinds of machine tools, for which the supply is inadequate to meet the demand. Few of them have any of these in stock, and the majority report inquiries which they are unable to fill. This condition is probably accentuated by the fact that nearly all the Cincinnati houses are snowed under with business, and consumers have to go to the second-hand dealers to fill their wants. There is one bad feature to this trade, however. Collections are slow, and promises to pay as soon as others pay are frequent.

Expansion with manufacturers in this field appears to be the order of the day. A list of all the concerns that have completed or are contemplating improvements and extensions to their plants, would be an enumeration of about all the manufacturers in this territory. There is an unexampled activity in the building line in this city and throughout the West generally, indicating the firm belief of manufacturers of an indefinite continuation of present industrial conditions. Many are seeking foreign fields for markets for their increased output, and the results thus far have been very satisfactory. The Union Drop Forge Co., Chicago, recently received an order for 450,000 drop forgings from Sheffield, Eng. The Trees Mfg. Co., Greenfield, Ind., reports an export order for 100 Hancock gasoline engines. The Chicago Pneumatic Tool Co. states that its foreign sales this year have exceeded the total for the same period of any year in the company's history. Armstrong Bros. Tool Co., Chicago, has established agencies in Australia and New Zealand, also an agency in Christiania, Norway, for the countries of Sweden, Norway and Denmark, and reports that it has received some very nice orders from the latter named agency. Fairbanks, Morse & Co. has just opened an office in London, Eng., to take care of its foreign business, and concerns that have had offices established in foreign cities for some time all report an increase in their foreign sales. Crane Co., Chicago, sent a representative some weeks ago to Russia to drum up trade. C. E. Lee, of Raymond Bros.' Impact Pulverizer Co., Chicago, manufacturers of pulverizing machinery, who has just returned from a trip to Europe in the interests of his company, states that American goods have found their way everywhere in Europe, and that an American salesman has no longer to argue about the quality of the article he is selling. "American machinery is accepted as a standard," Mr. Lee is quoted as saying. "If you ask for the best saw, for instance, you will be shown one of an American make. European manufacturers are making goods to resemble American ones. We excel, perhaps, most in machine tools. They are of superior design and best adapted to the work for which they are intended." Manufacturers of mining machinery in this city have always had an excellent export trade. With the opening of the mines in South Africa, the Sullivan Machinery Co. reports that inquiries from that country are more numerous. A. J. Fisher, 50 S. Clinton street, Chicago, manufacturer of the Fisher air compressor, has an inquiry from Calcutta, India. The Chicago Fire Proofing Co. reports inquiries from Japan.

Garden City Fan Co., Clinton and Washington streets, Chicago, manufacturer of exhausters, pressure blowers, ventilating fans, hot blast apparatus, etc., has found it necessary, owing to increasing business, to build a new plant. This has been located at Niles, Mich., and the company anticipates moving into it some time this month. The buildings are already erected and contracts have been let for the machinery. The foundry will be 190x80 feet, part of which will be two stories in height, and the machine shop, 200x80 feet, two stories high. The company is laboring under a pressure of business in all its departments, and is from two to three weeks behind in orders. It shipped in the last week to the sugar pine country in south central California one of the largest dry kilns ever erected in that section of the country, and has made many shipments of blowers and fans, large and small, to all parts of the country in the last month.

Fairbanks, Morse & Co., Chicago, report that the volume of orders for gasoline engines from agricultural sections of the country has increased remarkably in the last few months, keeping the company's plants at Three Rivers, Mich., and Beloit, Wis., extremely busy. The company also manufactures a line of steam pumps, electrical machinery, steam engines and boilers, marine machinery and railroad supplies, all of which departments have been crowded to the utmost. It recently erected three large coaling stations on the lines of the New York Central & Hudson River Railroad, one on the Buffalo Creek Railroad, one on the Wisconsin Central, and one on the Baltimore & Ohio.

Roth Brothers, 88-92 W. Jackson boulevard, Chicago, manufacturers of motors and dynamos, have been compelled to increase their floor space four times since they started in business three years ago. They have now leased an additional floor in the building in which they are located, which, when equipped with machinery, will give them double the present capacity of their works. Two new lathes, and probably a milling machine, will be needed in the extension. They report that the business done in February of this year, exceeded in volume that of any other two months in their history, and that the sales

in March will eclipse by one-third the sales of February. This rapid growth has necessitated many additions to the working force and the company are now employing one-fourth more hands than at the first of the year.

E. A. Delano, 50-52 South Canal street, Chicago, manufacturer of pulley molding machinery, states that business is very brisk and a large number of inquiries for his pulley molding machine and pulley drilling and tapping machine are received each month. Some recent orders booked are from the following concerns: Dodge Mfg. Co., Toronto, Can.; Colorado Iron Works, Denver, Colo.; Webster Mfg. Co., Chicago; Wheeland Machine Works, Chattanooga, Tenn.; the Deane Steam Pump Co., Holyoke, Mass.; Utica Steam Engine & Boiler Works, Utica, N. Y.; Willamette Iron & Steel Works, Portland, Ore.; and Huntley Mfg. Co., Silver Creek, N. Y.

Western Electric Co., Chicago, is getting out a "Red Book," illustrating a number of applications of its motors to machinery of different kinds. There are about 150 illustrations in the book, including applications to machines used in the iron and steel industry, drills, milling machines, lathes, polishing machines, wood-working machinery, etc. The book contains also illustrations of installations of generators direct-connected to steam and gas engines; also photographs of street lighting, showing the distribution of light from enclosed arc lamps. The company's sales of motors for direct-connection to machine tools has had a phenomenal growth this year, indicating the popularity and rapid growth of electrically-driven tools among machinery manufacturers and others. The company recently installed a 500-kilowatt generator in the plant of the American Hide & Leather Co., Chicago; a complete generator installation in the Wells building, Chicago, and a central plant at the Chicago University. It is extremely busy in all its departments of electrical supplies and machinery, and looks for a continuation of present industrial conditions for an indefinite time.

Joseph T. Ryerson & Son, Chicago, announce an active demand for improved labor-saving machinery for boiler shops and kindred industries. Lennox bevel shears, Lennox splitting shears, air compressors, Hilles & Jones bending rolls, power punches and shears, etc., have been ordered in the last few days by the following firms among others: Aurora Boiler Works, Aurora, Ill.; Kewanee Boiler Co., Kewanee, Ill.; Marion Steam Shovel Co., Marion, O.; Penman Steel & Iron Works, East Chicago, Ind.; Swift & Co., Chicago; W. W. Montague Co., San Francisco, Cal.; Heil Rail Joint Welding Co., Milwaukee, Wis.; Terre Haute Boiler Works, Terre Haute, Ind.

The Trees Mfg. Co., Greenfield, Ind., manufacturer of the Hancock gas and gasoline engines, reports the receipt of an export order for 100 of its engines. The company has been organized only a year, but so rapid has been the growth of its business that already it has been found necessary to increase the capacity of its plant. A new universal Bickford drill, shaper, and Lodge & Shipley lathes are being installed, and as soon as these are in operation the plant will run day and night to fill orders on which the company is behind.

Union Drop Forge Co., 64-76 E. Ohio street, Chicago, manufacturer of steel drop forgings and oil burning furnaces, has orders on its books sufficient to keep its plant busy to Jan. 1, 1903, if not another order were taken in the meantime. It has plans for extensive improvements to its shops, but owing to the condition of the structural steel market these cannot be carried out until next spring. It is enlarging its forging department and will install four 2,000-pound drop hammers and an additional 10,000-pound steam hammer to meet the increased requirements. One noteworthy order which the company has received in the last month is from Sheffield, Eng. It amounts to a total of 450,000 pieces, ranging from three ounces to 1¼ pounds. The company states: "The rush of business so far as we are concerned is unprecedented."

Stover Mfg. Co., Freeport, Ill., maker of windmills, etc., is moving into its new factory which has been under erection for the past twelve months. This will be devoted entirely to the manufacture of the company's implement line, while the present plant will be utilized for the hardware end of its business. The new factory covers about 6½ acres of ground and is thoroughly modern in construction and equipment. The increased demand for its machinery, the company states, has made this move on its part necessary, as it now has orders on its books amounting to more than 100 per cent more than it had a year ago. New inquiries and the business outlook are both very satisfactory.

B. F. Barnes Co., Rockford, Ill., manufacturer of machine tools, upright drills and lathes, reports that while it has no particularly large orders or shipments to mention at this time, it has been in receipt of a steady volume of business.

Gardner Governor Co., Quincy, Ill., manufacturer of air compressors, governors and pumping machinery, is enlarging its line of air compressors, for which it informs us it has had an excellent demand. The company is erecting a large warehouse, which it expects to have completed in the next few weeks, and is installing a number of new tools in its shops. The large volume of business for several months past has taxed the capacity of its plant to the utmost, and the company is somewhat behind on its orders.

Anderson Tool Co., Anderson, Ind., manufacturer of Lee universal grinders and enclosed arc lamps, will move into larger shops May 1. It has purchased for this plant an electric crane from the Northern Engineering Works, Detroit, Mich., and is in the market for a 50-horsepower gas engine for the same. No new machine tools will be purchased at the present time, as the company installed several some months ago. When in its new quarters, the company will immediately put on the market a belt-driven grinder, and largely increase its output of electrically-driven machines.

Chicago Pneumatic Tool Co., Monadnock block, Chicago, will move into larger offices in the Fisher building, May 1. The company's sales in January were largely in advance of the monthly sales in 1901; those of February exceeded those of the previous month, and the sales for March showed a good increase over those for any preceding month in the year. The company is receiving orders for pneumatic tools and air compressors from all over the world, but the best showing is from the domestic field. Among the orders received was one for a large number of tools for the new plant of the Standard Steel Car Co., and it is constantly receiving orders for additions to plants already in service. The prospects for business in the pneumatic tool line were never better, and it is believed the present year will surpass all records.

The Hill Machine Co., Anderson, Ind., manufacturer of pumping machinery, anticipates a very active year, being in receipt of more orders and inquiries for its line of pumps than is usual at this period. It recently made shipments of deep well pumps to the following points: Big Four Railroad, Brightwood, Ind.; Missouri Pacific Railway, Horace, Kas., for a well 1,300 feet deep; the Marion Electric Light & Power Co., Marion, O.; one pump for a stone yard, Indianapolis, Ind.; one pump for rubber works at Jonesboro, Ind.; one pump to Pittsburg, Pa., another to Williamsport, Pa., and another to Chicago. The company has also recently shipped power and steam pumps to Toledo, Greenwich, Wauseon and Boughtonville, O.; Minneapolis, Minn.; Richardson, Wis.; Pembroke, Ky.; St. Louis, Mo.; Barren Springs, Va., and to Muncie, Noblesville, Rockport and Dugger, Ind.

The Link-Belt Machinery Co., Chicago, reports that business has been very satisfactory, and, if anything, better than for the same period of last year. Inquiries are plentiful, and the company looks for a continuation of present conditions.

Armstrong Bros. Tool Co., Chicago, has found a marked increase in the export demand for tool holders. It has recently established agencies in Australia and New Zealand, which give every promise of developing into important markets. Some time ago the company sent Mr. Nestor Johnson into Norway, Sweden and Denmark to investigate that market and to introduce the Armstrong tools. Mr. Johnson, who is a native of Norway and a practical mechanic of wide experience, met with the most gratifying success. He has recently returned to Chicago after placing the Armstrong agency for the countries mentioned with the firm of C. S. Christensen, of Christiania, Norway. Mr. Johnson relates many interesting experiences which he had while traveling in the company of one of C. S. Christensen's engineers, visiting the largest machine shops in the countries named. One of the most interesting of these occurred at the plant of the Moss Mechanical Works, at Moss, Norway, while making a demonstration of the Armstrong gang planer tool at the request of Mr. Karl Olson, superintendent of the works. The subject of the test was a large cast iron plate used in connection with pulp mill machinery, and

Superintendent Olson announced their regular time on this job as seven hours. Mr. Johnson and the gang planer tool finished it in 13¼ hours. Numerous large orders for Armstrong tools and self-hardening steel sent in subsequently by C. S. Christensen testify to the practical and convincing nature of Mr. Johnson's work and the merits of the tools he introduced.

Reeves Pulley Co., Columbus, Ind., states that the wood split pulley business is exceptionally good for this season of the year, the South in particular giving promise of a large business. It is running full force in this department and in the Reeves variable speed transmission metal department, it is also exceedingly busy. The company has so much business on its books, that it is wondering how it will get all the orders filled and keep its customers in good humor. Among recent large orders are the following: One No. 10 for the Wabash Paper Co., Wabash, Ind.; one No. 9 for the Brownville Board Co., and one No. 12 for the Pusey & Jones Co., installation in the plant of the Uncas Paper Co., Norwich, Conn.

Walter L. Flower & Co., Chemical Building, St. Louis, Mo., reports an active demand for the Acme oil filter, with every indication that in the near future their manufacturing capacity will be taxed to the utmost to fill orders for it and other specialties.

The Fred W. Wolf Co., 139 Rees street, Chicago, manufacturer of ice and refrigerating machinery, is in receipt of many orders for its machines, which come from all sections of the country. Recent orders included a 40-ton refrigerating and 8-ton ice machine for shipment to Wapokoneta, O.; 15-ton refrigerating machine for Chicago concern; 25-ton refrigerating and 10-ton ice making plant for Gilmer, Tex.; and others; also direct expansion piping, ammonia condensers, etc., for shipment to Chicago, Alton, Dayton, Omaha, Richmond and other cities.

CINCINNATI.

CINCINNATI, April 1.—All of the Cincinnati machine tool builders report quite a satisfactory business. Most of them continue to operate double shifts of men and many of them report an improvement in the foreign trade as well as a continued satisfactory domestic business. Nearly every machine tool concern of importance in the city has either made additions to existing plant in the past year or is preparing to do so. A number of them have been compelled to abandon their old locations entirely and seek new quarters. Among the latter is the American Laundry Machine Co., which will soon begin the construction of its new plant in the suburbs. The Wais-King Punch & Shear Co. will soon be in its new building at Winton Place. The Louis Lipp Co. has about completed its new factory in the same suburb and as soon as it is occupied the old plant down in the city will be turned into a foundry for general jobbing work.

The American Laundry Machinery Co. reports that the business that it has on hand is larger than it can conveniently attend to. Until the large new factory building to be erected in the suburbs is done it will necessarily be a good deal crowded in its present temporary quarters. The foreign business of this company is quite large, and during the past week an order was received for a complete outfit for the University at Odessa, Russia. Another large outfit was ordered for Sidney, New South Wales, both of these orders being for as early shipment as the company can arrange. While the foreign business has been good the company reports that the domestic trade is even better and the demand is greater than has been noticed for some years.

The Tudor Boiler Mfg. Co. has just received an order for a large 250-horsepower vertical Lynn boiler to be shipped to the Diamond State Steel Co., Wilmington, Del. Another of these boilers has just been ordered to be shipped to Trindaro, Kan., and the company is having a very good demand for this class of boilers of which it has erected a large number all over the entire country in the past year and a half.

The Cincinnati Milling Machine Co. reports an improvement in the foreign trade, some orders being received from Russia and there being even an improvement in the inquiry from Germany. Inasmuch as Germany has been the worst market of all the European countries it would now appear that there is certainly a general improvement. The concern has just gotten out its printed matter for 1902, in which it has been making a specialty of the new style of gear feed mechanism. The domestic trade is as good as it has been for the past year, which is saying that it is all that could be desired. Day and night forces are employed and the plant is being operated quite full.

The J. H. Day Co., 1114 Harrison avenue, has purchased one and a half acres of ground adjoining its plant and will erect a foundry 100x165 feet. It will be completed in July.

The Cincinnati Scale Co. has just made a large shipment of its grain testers to Australia. This concern makes a specialty of small scales and of testing apparatus of this sort as well as going extensively into the manufacture of track scales. The business in the larger kinds is not quite so good as in small machines.

There is some interest in the sale that is to be held April 9 and 10, of the entire outfit of the Cincinnati Safe & Lock Co. This concern not long ago passed into the hands of a receiver. The offerings will include metal working machines, engines, boilers, materials, patterns, etc., as well as the entire stock of over 175 finished safes.

The arrangement that has existed heretofore between the Bullock Electric Mfg. Co., of Cincinnati, and the Wagner Electric Co., of St. Louis, has been discontinued and the sales department that has heretofore been conducted jointly by the two concerns now passes into the control of the Bullock Co. This was decided upon because the business of the Cincinnati concern was the larger of the two. There is some talk that a new deal may be made, taking in these two concerns and a number of other independent electrical concerns into a single corporation. There is nothing definite in this matter at the present time, however, and for the time being the sales department will be managed from Cincinnati, the output of the Wagner company being handled by the agency with its branches all over the country under a special arrangement.

The Blymyer Iron Works Co. has been doing quite a large business with Cuba and Mexico in sugar machinery. It has also some trade in the Philippines and the introduction of its coffee machinery into Brazil has been followed by quite a successful business. The company has recently entered into correspondence with concerns in Japan and other oriental countries, from which there has already resulted a good deal of business with prospects of more. One of the members of the company is now in Mexico looking after the trade there.

A deed was given the past week to the Hoeffinghoff-Laue Foundry Co., covering the property on which the Norwood foundry has been built. The foundry company now controls two foundries, one down town and the one in Norwood, the latter making large castings especially for the Bullock Electric Mfg. Co. and also doing a general jobbing business.

The Laidlaw-Dunn-Gordon Co. has not begun on any of the work that it will have to do in connection with the construction of a large pumping engines for the new City Water Works. The concern is a branch of the International Steam Pump Co., and the contract for the engines was awarded to the Holly branch, but it was understood at the time the contract was let that the Cincinnati concern would have part of the work. The inability to get structural material has interfered with the work of building a new foundry in connection with the Laidlaw-Dunn-Gordon plant, but it is understood that it will be built and in operation within the present year.

A disagreement among the large stockholders of the Belmer-Eames Machine Tool Co. has resulted in the application for a receiver for the concern. It is alleged by Mr. Belmer that Mr. Eames agreed at the organization of the company to take charge of a certain part of the work, while Mr. Belmer was supposed to put up a greater part of the money. The matter has not yet been decided by the court.

The Cincinnati Traction Co. has recently let contracts for a large number of new machine tools for the Chester Park car shops. The company will begin the construction of cars for its own use and also for other companies that are controlled by the Widener-Elkins-Dolan syndicate, which also controls the Cincinnati company.

The United States Cast Iron Pipe & Foundry Co. was the only bidder for the large amount of castings to be used in connection with the work on the new Cincinnati water works. It is significant that the bid was $6,000 over the estimate of the city engineer on a total bid of $28,000.

The Lodge & Shipley Machine Tool Co. has begun upon the improvement at the big plant of that concern, material being

on the ground for an addition that will practically double the capacity. There will be no trouble about getting the structural material, and it is expected that the work will be well under way when good weather opens. This company has just taken an order for the Baltimore & Ohio Railroad for 15 lathes. These are to be used in the various shops of the railroad and will be distributed all the way from Baltimore to points in Indiana. The firm reports that business is in a very satisfactory condition and there is a solidity about it that is very gratifying; that there is no sign of any change, unless it is a further improvement in the foreign business.

Schumacher & Boye report that there is a considerable demand from almost all sections of the country for their machines, and their concern is running full, with prospects of a considerable increase. The foreign demand is not at all disappointing and inquiries are coming from a number of points that for some time have been rather quiet.

The J. A. Fay & Egan Co. has been having a very satisfactory business. There are a number of important saw mills opening up in the South and Thomas P. Egan, president of the company, is now on an extended trip as far south as New Orleans. He expects to install a number of complete equipments in some large planing mills that are starting up. The company has had an unusually prosperous year and reports that prospects are even more favorable for the year to come.

The Triumph Electric Co. is having quite an extensive business in installing its engines in electric lighting and in machinery plants throughout the Middle West. The company reports business very good in another branch of the same concern, operating a plant for the manufacture of ice machinery which is now having the best business that it has had in months. This is the season for ice machines, but the company says that the business is even better this spring than it has been for several years past.

The Block-Pollak Iron Co. reports a very good demand for all kinds of shafts and shipment of some unusually heavy ones to machine builders in the Middle West and the East. Some of the shafts that have been contracted for weigh eight to nine tons. The demand from shipbuilders is also heavy.

CLEVELAND.

CLEVELAND, April 2.—The Bowler Foundry Co. has added a complete machine shop to its equipment and is now prepared to make estimates on machinery construction and high grade machinery casting. The company is negotiating for a site on which to build a new foundry and machine shop. This is necessary to take care of a rapidly increasing business.

The Stirling Boiler Co. last week made a shipment of boilers to Porto Rico from its Barberton, O., plant. It required 41 cars to make the shipment.

The Eller Steel Roofing Works, Canton, O., are now employing 90 men. Recent shipments were made to Cuba, the Bahama Islands and South Africa.

The Cleveland Axle Works and the Canton & Cleveland Spring Works at Canton, O., are running to 8 p. m., and large orders are on hand for shipment to all parts of the country.

The Globe Machine Stamping Co., of Cleveland, O., has been incorporated with $10,000 capital. W. J. Maurer, J. C. Lower, A. S. Maurer, C. F. Schroeder and Charles Higley are the incorporators.

The Cleveland Pneumatic Tool Co. is running to the limit of its capacity. The company has just received an order for 40 pneumatic hammers from one of the most prominent shipbuilding concerns of the Atlantic coast. It may be noted that all the rivets that were driven on Emperor William's yacht *Meteor* were driven with riveting hammers made by this Cleveland company.

The Vulcanus Forging Co. is three months behind its orders and reports the outlook never brighter. It has let a contract for an addition to the plant and has also placed orders for new machinery. W. E. Renner, formerly superintendent of the Steel Car Forging Co., of Ellwood City, Pa., has become connected with the concern in the capacity of superintendent. He is known as one of the best car forging men in the country. A large Government order is now under way at the Vulcanus works and a contract with a well known Eastern firm was closed recently amounting to $30,000. The track bolt business has been added recently and the present output is about a carload a day. The plant is being operated day and night.

At the annual meeting of the Wellman-Seaver Engineering Co., action was taken to change the name of the corporation to the Wellman-Seaver-Morgan Engineering Co. The desire was to give proper recognition by this change to the ability and services of Thomas R. Morgan, who for several years has been secretary of the company. Mr. Morgan before his connection with the Wellman-Seaver company was general manager of the Morgan Engineering Co., at Alliance, O. He has had a wide experience in engineering lines, and his connection with the Wellman-Seaver Engineering Co. has contributed much to the marked growth and prosperity of that company. The title of Mr. Morgan has also been changed to secretary and works manager. He will have direct charge of the large manufacturing plant of the company now nearing completion. The list of officers, the others remaining as before, is as follows: S. T. Wellman, president; J. W. Seaver, vice-president; C. H. Wellman, general manager; T. R. Morgan, secretary and works manager; A. D. Hatfield, treasurer; C. W. Comstock, purchasing agent and assistant secretary.

Manning, Maxwell & Moore report one of the largest Ohio contracts for machinery recently closed—complete shop equipment for the Buckeye Malleable Iron Co., whose steel casting and malleable plant is nearing completion at Columbus, O.

An addition now being finished by the Chisholm & Moore crane plant of the Chicago Pneumatic Tool Co. will nearly double the capacity of this shop.

The American Foundry & Machine Co., whose plant at Ravenna is under construction, has been buying equipment through its office, 1415 Williamson Bldg. A contract has been closed for a 120-h. p. McEwen engine direct connected to a 75-k. w. C. and C. generator. Several large motors have been bought and a portion of the needed machine tools. The machine shop of the Ravenna plant will be 132x121 feet, the foundry 122x75 feet, and the supply shop 120x75 feet. Rock crushers and other mining machinery will be manufactured and a jobbing business carried on.

A keyseater of Baker Bros., Toledo, manufacture has been sold recently to the Carroll Foundry & Machine Co., Bucyrus, O., through the Marshall & Huschart Machinery Co.'s Cleveland branch. February and March with this agency have been well abreast of the corresponding months last year in orders closed.

The Inter-State Foundry Co. has taken a permit for the erection of a new foundry, 148x300 feet, of steel, brick and wood, to cost $35,000. Kaltenbach & Gries are the architects, the contract for the steel construction has been taken by the American Bridge Co.

The National Acme Mfg. Co., maker of the Acme multiple spindle screw machine and manufacturer of machine screws, cap screws, etc., is in the midst of moving into its new plant, with more business in the shops than it can handle.

The Patterson Foundry Co., Lake and Wason streets, has sold its entire business and plant to the Blakeslee Foundry Co., of this city, and the Messrs. Patterson will devote their entire attention for the present to their rivet and forging business—that of the Cleveland Rivet & Forging Co. They expect, however, to engage again in the foundry business.

The Cleveland Rivet & Forging Co., manufacturer of rivets, bolts, railroad and special forgings, has four new rivet machines under way and expects to add other forging machinery within a short time. The plant is very busy and some large orders have been received in the past ten days.

NEW YORK AND VICINITY.

NEW YORK, April 1.—Through James D. Williams, of New York, and Hugh L. Thompson, of Waterbury, Conn., engineer for brass and copper plants, the Benedict & Burnham Mfg. Co., of Waterbury, purchased last week the tube making machinery, licenses, shop right and patents owned by the Mannesmann Cycle Tube Works, of Zylonite, town of Adams, Mass. This concern was organized some time in 1896 by the Mannesmann Brothers—Max, Rheinhardt and Alfred—the sons of the inventor of the Mannesmann process and machines. Through some misfortune or mismanagement the project failed and the Mannesmanns gave up in August, 1898, without having successfully started the works. The plant was then leased to a company which ran a part of it from

November, 1898, to some time in May, 1899. In this time they produced about four hundred and fifty thousand lineal feet of merchantable bicycle tubing. Since that time the works have been idle, and the property was finally sold by order of the District Court of the United States for the Southern District of New York. The tube machinery will be removed and the property used for manufacturing purposes.

The Brown Hoisting Machinery Co., of Cleveland, O., has recently made a shipment of a 10-ton electric crane to the Queensland Government which will be used in handling coal at the Brisbane docks. The equipment will be operated by a 125-h. p. motor, built by the Elwell-Parker Electric Co., of Cleveland, O.

Benjamin Atha & Co., manufacturer of steel castings, has sub-divided its work among four different foundries. One is used for castings for electrical purposes, another for machine molded work, the third for heavy castings and the fourth for miscellaneous work. The company now makes a special feature of castings running from 10 to 200 pounds which can be made upon molding machines, as in this way accurate results are attained and the work gives thorough satisfaction wherever it is used. In this line are being made a great many castings for car trucks, couplers and draw bars, and also light castings for electrical work when they are used in large numbers. In the heavy foundry work running as high as 50,000 pounds in weight is handled. The total capacity of the plant is from 1,000 to 1,200 tons per month.

The Crocker-Wheeler Co. received in March orders for eleven more motors to be added to its equipment in the new Philadelphia Mint. This brings the total number furnished to 120, besides four generators aggregating 625 kilowatts.

The Mexican National Railway authorities are reported to have awarded a contract to the Lawrence Machine Co., of Lawrence, Mass., whose New York offices are in the Taylor building, 39 and 41 Cortlandt street, for three complete installations of centrifugal pumps, direct connected to vertical engines, each having a capacity of 6,000,000 gallons daily.

Hill, Clarke & Co. will shortly occupy a store at Greenwich and Liberty streets, New York.

D'Amour & Littledale Machine Co. has sold its business, good will, machinery, etc., to the Chapin-Love Machine Co., 129 Worth street, New York City, which was recently formed to take over this business. The new firm is composed of young men and announces that its business will be conducted on progressive lines. This company's specialty is the manufacture of sensitive drills.

The American Turret Lathe Co., of Wilmington, Del., is erecting large shops at Warren, Pa., which are expected to be in operation by July 1. The Wilmington plant will be vacated and the name of the company will be changed to the American Turret Lathe Mfg. Co.

N. A. Lombard Co., 64 School street, Worcester, Mass., has been bought by E. H. Ingram and J. J. Wehringer, of the Wm. H. Eddy Co., and will be in the market for some new machinery shortly.

Bullard Machine Tool Co., New York and Bridgeport, has secured a large order for boring mills from the Baltimore & Ohio Railway. The company will remove its New York office to 95 Liberty street on May 1.

Jones & Lamson Machine Co., Springfield, Vt., announces that it will shortly build a large fire proof shop.

The Link Belt Machinery Co.'s New York office reports a shipment of machinery to Hicks Hargreaves & Co., Bolton, Lancashire, Eng.

R. Percy Sellon, of the Brush Electric Engineering Co., of London, is now on a visit to the United States.

The Stirling Co., 26 Cortlandt street, New York, has just made a shipment of many carloads of boilers to be installed in Porto Rico sugar plants.

The Stilwell-Bierce & Smith-Vaile Co.'s (Dayton, O.) New York office, Washington Life building, has some large contracts on hand for turbines and pumping outfits for shipment to F. Neill, of London, Eng.

The DeLaval Steam Turbine Co., 74 Cortlandt street, is buying the balance of the machine tool equipment for its new works at Trenton, N. J.

Worham & Magor, of 29 Broadway, have incorporated as the Worham & Magor Engineering Co., capital $20,000. They are building new works for the manufacture of industrial railway equipment.

The Butler Chuck Co., of Greenfield, Mass., has been recently organized to manufacture a patented drill chuck.

The A. J. Beckley Co. 286 Pearl street, New York, has equipped a new factory at Garwood, N. J., with machinery and dies capable of punching metal of any thickness. This company manufactures a large line of perforated metals.

The Maryland Rail Co., of Cumberland, Md., will start up May 1 with a larger number of men manufacturing rails and steel shafting. The directors for the first year are N. A. Taylor, of N. & G. Taylor Co., Philadelphia; W. C. Dickey, N. Y., H. H. Dickey and H. E. Weber, of Cumberland, Md., and Albert F. Baumgarten, of Pittsburg.

S. L. Moore's Sons' foundry, Elizabethport, N. J., was damaged by fire to the extent of $15,000.

Arthur Warren, of the British Westinghouse Electric & Mfg. Co., has arrived in this country.

Wallace Buell, of the Dominion Iron & Steel Co., Sydney, Cape Breton, has made application for membership in the New York Metal Exchange.

The Engineering Building, 118 Liberty street, New York, will be ready for occupation May 1 and many machinery firms in that neighborhood have announced that they will remove at that date to the new building. Among them are the Q. & C. Co., who will vacate their store at Liberty street and Church street, and the various companies composing the International Steam Pump Co., who are located along both sides of Liberty street.

The Utica & Mohawk Valley Railway Co., of Utica N. Y., is to build new shops at once. The secretary, A. L. Linn, writes that their company is in the market for considerable new machinery

The George F. Blake Mfg. Co. filed a report of its financial condition March 1, as required by the Massachusetts Commonwealth. It showed total assets of $6,572,822 and a reserve of $749,412; profit and loss account $1,186,464.

The engineering firm of Snare & Triest, with offices in the Taylor building, 41 Cortlandt street, has made the low bid, about $300,000, for the construction of a pier, warehouse, etc., at Matanzas, by the United States Government.

The Metropolitan District Traction Co., which operated the underground railway in London controlled by Charles T. Yerkes, has awarded a contract for 48 boilers, valued at nearly $300,000, to the Babcock & Wilcox Co., Ltd., of Great Britain.

It is reported that the Monterey Iron & Steel Foundry, at Monterey, Mex., is about to be considerably enlarged for the manufacture of gasoline engines and it is said to have shipped a narrow gauge engine to the Beaumont Lumber Co., of Texas. This is probably the first Mexican-built locomotive ever forwarded to the United States.

The courts have appointed Attorney William L. Bennett, of New Haven, Conn., permanent receiver, and Judge Otto Crouse, of New Jersey, co-receiver for the Driggs-Seabury Gun & Ammunition Co., of Derby; and as appraisers, Henry De B. Parsons, of New York, and Joshua Fessenden, of Stamford. The company will now go ahead under the management of the receivers and finish existing contracts.

The Japanese Legation at Washington, is reported to be negotiating with the Prentice Bros. Co., of Worcester, Mass., with a view to placing a contract for machine tools to serve as equipment for one of the arsenals now being built by the Japanese Government.

Henry S. Loud, of the British Westinghouse Electric & Mfg. Co., Ltd., who has been engaged at Pittsburg for several months in connection with the placing of the machinery contracts, etc., for the British company's new works, will sail this month for Europe to assume the general managership of the English works. Mr. Loud was formerly general manager of the Nicopol Mining & Metallurgical Co.'s works, South Russia.

PHILADELPHIA.

PHILADELPHIA, April 1.—It would be hard to point out more than a very few openings for improvement in the machinery trade in this market. Principal reference might be made to the demand from abroad which has slackened to a condition which gives rise to the feeling that we may not in the future expect an approach even to the state of things in

existence only a year ago. The movement of foreign orders has been for some months spasmodic, and when we consider the army of mechanics from the other side now planted in our shops for educational purposes we cannot wonder that we may be on the eve of a vast change in so far as the export business in machine tools and appliances is concerned. There are a good many straws out to show the way the trade winds are blowing. Chief among these is that indicating the transference of capital by those interested in American machine plants to European centers. As an instance it is only necessary to mention the immense works now in course of construction by the British Westinghouse Co. at Manchester, England. Here is a whole colony imbued wtih American ideas of progress and economy, for the housing of whom it has been found necessary to arrange for the building of many hundreds of American homes. And who shall say that it is not a beginning of the planting in England of American ideas which shall at all times be in touch with current modes and practices in this country.

In general the home trade is in an extremely satisfactory condition. A decided lull noticed a couple of months ago has passed off, and inquiries and orders are sufficiently prolific to insure great activity in nearly all the shops for some time to come. Little change in prices is noticeable, in fact there is little inclination to undersell in any line. Deliveries are a little bothersome at times, but as a rule this condition can only be applied to large machine tools and equipment. Anything of a standard character is delivered with reasonable promptness, and very little complaint is heard in this respect.

In supply lines there are possibly more contingencies to be met than in any others. Foundries generally have some difficulty in keeping up their supplies of raw material, and this condition naturally affects their deliveries under contracts. They have a great deal of work in hand and prices of castings are well maintained.

The foundry supply business is particularly active, and this may always be taken as a keynote to general conditions. Few foundries are running less than five heats per week, and some are running six. It is only a scarcity of molders and raw materials that prevents six heats a week as a rule.

Hales & Ballinger, Philadelphia architects, are preparing plans for extensive additions and improvements to the plant of the Jeansville Iron Works Co., of Jeansville, Pa. The improvements include a one-story foundry building, a three-story pattern shop, a large addition to the machine shop, a new three-story office building, and several other minor improvements. When the improvements are completed it is expected that the output of the plant will be doubled.

The Midvale Steel Works are about to build a new two-story brick pattern shop, 46½ feet by 150 feet, at their Nicetown plant.

The Tabor Mfg. Co., manufacturer of molding machinery, is running its plant to its capacity. Inquiries are quite numerous and orders are satisfactory in volume. In addition to an order lately received from Russia for six special molding machines the company has within a day or two received an order for two more. Among work in hand is mentioned an order for 23 Tabor machines for the General Electric Co., for its Schenectady, N. Y., plant, making over 90 of the same type ordered by that company.

At the works of Wm. Sellers & Co., Inc., there has been during the past four weeks a noticeable increase in activity. Among orders lately taken is one for twelve 72-inch boring mills for the Standard Steel Co., which order is additional to one taken some time ago for several similar machines.

The American Pulley Co. report business very good at their works, with a large amount of foreign business in hand covering all the principal shipping centers in the world. Home trade is particularly good at these works, and several carload shipments have recently been made to Western points.

The Hess Machine Works, manufacturers of file making machinery, are very busy on orders for their products. The bulk of the business at present in hand is from foreign sources, and inquiries are very satisfactory in volume.

The Eynon-Evans Mfg. Co. are quite busy in their different departments. The recent additions to their plant have materially increased the volume of their production. Among orders in hand is one for a 10-inch condenser for a new plant at New London, Conn., and another from Colgate & Co., Jersey City, N. J., for a condenser similar to the large one recently shipped to them. The company has also been awarded the contract for remodeling and increasing the condensing plant of the Maryland Steel Co., at Sparrow's Point, Md. The injector department is particularly busy on orders for Eynon-Korting injectors, and the pattern department which has grown to be quite a feature of the business is running on a quantity of work for the Wm. Cramp Ship & Engine Building Co., Baldwin Locomotive Works, and other prominent concerns.

The Keystone Machine Tool Works are running overtime at their works on orders for cold saw cutting off machines and other tools. Among the orders in hand they mention several from the Marshall & Huschart Machinery Co., of Chicago, covering cold saws, and one from the Walton Iron Works, of Cincinnati, O., for three cold-saw outfits. They are getting a good many inquiries and orders for the pipe expanding and flanging machine they recently placed on the market.

The J. W. Paxson Co. reports a very active demand for foundry supplies of all kinds, with a good many orders in hand covering some large equipments. These include several outfits of Charlier furnaces for melting brass and iron.

H. M. Shimer & Co., Philadelphia, are erecting a new smelting plant at 19th and Washington avenue, which will be completed May 1.

Several Weiss condensers are under construction by the Southwark Foundry & Machine Co. The plant is busy in all departments.

The Link Belt Engineering Co. will increase its drawing room by an addition 90x40 feet and has let the contract.

The Nickel Combine Completed.

The International Nickel Co., in which President Schwab, of the United States Steel Corporation, is largely interested, was incorporated in New York last week with a capital of $24,000,000, of which $12,000,000 will be 6 per cent cumulative preferred and $12,000,000 common stock. In addition there will be a bond issue of $10,00,000. While the United States Steel Corporation is not an owner, its interest in the new corporation is evident from the personnel of the officers of the new company. The election was held on April 1 and the following were elected: President, Ambrose Monnell, assistant to the president of the Carnegie company; chairman of the board of directors, Robert M. Thompson, president of the Orford Copper Co.; secretary, Stephen H. P. Pell; treasurer, Joseph Claudet; board of directors, Mr. Thompson, Mr. Monnell, E. C. Converse, of the executive committee of the United States Steel Corporation, John R. De Lamar, Max Pam, of steel corporation counsel, John W. Sarton, Millard Hunsicker, London representative of the Carnegie Steel Co., Dr. Leslie D. Ward, and Archibald W. Maconochie; executive committee, Mr. Thompson, Mr. Monnell, Mr. Converse, Mr. De Lamar, and Mr. Pam.

It was voted to take over the entire capital stock of the following companies: The Orford Copper Co., the Canadian Copper Co., the Anglo-American Iron Co., and the Vermillion Mining Co., which two are subsidiary to the Canadian Copper Co., but operated separately from it; the Nickel Corporation, of London; the Societe Miniers Caledonienne, of New Caledonia; and the American Nickel Works, of Camden.

Mr. Schwab's ownership of control in the Bethlehem Steel Co., which is the only armor plate manufacturer in the country apart from the Carnegie Steel Co., and the extensive use of nickel in armor plate, explain the large steel corporation representation in the organization of the new nickel combine.

The melting department of the Colonial Steel Co., Monaca, Pa., was placed in operation this week and the first tool steel will be sent to the trade within a few days. The other departments of the plant are to be placed in operation shortly. The main offices of the company are located in Pittsburg, while branches have been opened in New York, Chicago and Denver. The Colonial Steel Co. is the largest independent producer of tool steel in the country.

The Armstrong Bros'. Tool Co., of Chicago, was burned out on April 1. The damage amounts to $40,000; insurance, $25,000.

ENGLISH AND AMERICAN TOOL STEELS.

An article appeared in *The Iron Trade Review* of Jan. 16, recording the experiences of an English machinist in American machine shops. Among the assertions he made in reference to machine shop methods was the following: "English steel makers seem to have a monopoly of the American tool steel market. The Americans themselves admit that their steel is not so durable." This quotation was mailed to a number of firms with an inquiry as to how far the finding of the writer of the article agreed with their experience with American tool steels. A number of these replies from the most prominent users was published in *The Iron Trade Review* of March 6 and formed a highly interesting symposium, the varied opinion showing that many of the firms had carefully tested the several varieties of tool steel and that the verdict was far from bearing out the assertion of the English writer. The great majority of our correspondents were of the opinion that American tool steel was entirely satisfactory and in very general use. The attention of a number of firms directly engaged in the manufacture and sale of tool steels was drawn to the matter and these replies have been added to the testimony already submitted. The general conclusion of the entire series is that the allegation of our foreign critic may fairly be classed as "not proven."

Let Tool Steel Users Judge.

The following letter is signed by the author of a treatise on tool steel of wide acceptance as an authoritative and valuable work:

You already have the best testimony in the world, that of the keen, wide-awake, level headed American steel users. They are buying and using about 100,000 tons of American tool steel every year. Can any one suppose that they are a set of fools, that they do not know what they are about, that they are paying about $10,000,000 a year for inferior goods from mere sentiment?

We do not feel that any assertions of ours, we being the interested party, are of any value compared to the testimony of the consumers. Our steel is going out daily, and it is not coming back; we feel in this case that it is better to obey the scriptural injunction: "Let another praise thee and not thine own lips."

BRAEBURN STEEL CO.,
Braeburn, Pa. By Wm. Metcalf.

American Steel More Durable and More Regular.

I must say it surprises me that this statement in *London Engineering* should create any comment, as it is nothing but an advertising dodge on the part of some English concerns to give the impression that their steel still leads in America. Having had 40 years' experience in the steel business, however, and having been for a long time connected with the manufacture of high grade tool steel, I can only state that this is not the case. There has been, I know, a very great prejudice existing in the minds of some people in favor of English tool steel, but that has been gradually giving way, and the use of American steel for all kinds of tools—and particularly of the higher grades—has increased very rapidly within the past 10 or 12 years. For ordinary uses, such as axes, saws, mining drills, etc., English steel has long since ceased to be a factor in the American market, but many people for a long time continued to use it for certain tools because they were accustomed to it. I can only say, that during my past 10 years' experience our tool steel business doubled itself nearly every year, and particularly in the most expensive and highest grades, and I believe that a large part of the business came from those who had hitherto used English steel. It cannot be denied that America can produce steel that is better, more durable and regular, than any imported steel, for the simple reason that the scientific methods employed in this country make it more uniform and of a quality which is known by chemical analysis.

COLONIAL STEEL CO.,
Pittsburg, Pa. James W. Brown, President.

American Steel Will Be Preferred.

We have been representatives of Messrs. Thos. Firth & Sons, Ltd., of Sheffield, Eng., for many years, and this company has recently established a plant in America and are supplying therefrom all of their old American customers for English tool steel with steel of American manufacture, with very satisfactory results.

Furthermore, the trade from Firth & Sons' American mill has increased considerably within the last year or two, and while no doubt English tool steel will always be used in this market, we firmly believe that eventually American steel will be preferred, not only because of its superior quality, but also owing to the fact that the users of tool steel prefer to purchase their material in this country.

WHEELOCK, LOVEJOY & CO.
New York City.

American Tool Steel Getting an Export Trade.

We must express our surprise that any English writer could report to his own country that English steel has nearly a monopoly of the American tool steel market. The actual facts are that the American steels have far outstripped English products, and certainly three-quarters of all the tool steel used in this country is of native manufacture, and the difference is being steadily reduced in favor of our own makers. The uniformly good quality of American tool steel is so well recognized not only in this country but abroad, that there is a steadily increasing export trade for it, and not in the cheap grades either, but in the best qualities made here.

American hardware and edge tools are sold all over the world and in most of these will be found American steel. The success of the tool depends largely upon the steel used in it, and the principal American brands are too well known to all buyers to need any recommendation at our hands.

The old and good brands of English steel are still sold in this country to some extent, and during the past two years when the capacity of the American work has been taxed to the utmost and there have been unusual delays in the execution of orders, it may be that there has been some increase in the use of English steels, although the entire quantity is but a small proportion of what is used here.

PATRIARCHE & BELL.
New York City.

Percentage of Imported Steel Very Small.

We think on further investigation you will find that the English writer to whom you refer is very much mistaken, and that there is a very small percentage of the tool steel used in this country made abroad.

CRUCIBLE STEEL CO. OF AMERICA.
Pittsburg, Pa.

English Steel Makers' Branch Plants.

We do not handle the English steel at all, but we are perfectly satisfied that there is steel made in America that will compare favorably with the English steel and compares so favorably that it has been a cause of annoyance to the English manufacturers, and some of them have gone so far as to investigate the location in America of branch plants to compete with this steel. Further than that we are not in position to speak.

HORACE T. POTTS & CO.,
Importers and exporters of American and Swedish iron and steel.
Philadelphia, Pa.

Standard Steel Company.

(Special Telegram.)

PITTSBURG, April 2.—The Standard Steel Car Co., of this city, will not locate at Vanport, Pa., as was at first decided, owing to unfriendly railroad interests. The new site is at Butler, Pa., where 300 acres of ground have been secured for the new steel car plant and the rolled steel wheel plant of W. P. Schoen and others. Work on the erection of the plant will be commenced immediately and it is believed that the plant will be placed in operation no later than Aug. 1. The daily output is now estimated at 50 cars. The cars will be built of structural shapes and will be of an entirely different type from the pressed steel car. The company is capitalized at $3,000,000, and half of this sum is to be expended in erection and equipment. The directors are J. M. Hansen, A. R. Fraser, H. J. Gearhart, of Pittsburg; Edwin Hawley, of New York, who is president of the Minneapolis & St. Louis Railroad and the Iowa Central Railroad, and also closely associated with the Harriman interests, and L. C. Weir, of the Adams Express Co., of New York. The officers of the company now announced are: President, J. M. Hansen; vice-president, A. R. Fraser; secretary, A. S. Valentine; general manager, J. H. Gearhart; manager of works, Peter F. McCool.

Current Trade Press Topics.

Machine Tool Builders on Reciprocity.

[American Machinist, March 13]

An editorial reviews a series of letters received by the *American Machinist* from manufacturers of machinery (chiefly machine tools). They were in response to an inquiry for opinions on the expected benefits of reciprocity and the effect of the present tariff on domestic and foreign trade in machinery. Machine tool builders having developed their foreign trade with special energy and many of them having studied the problem of foreign markets in extended visits to European trade centers, they were likely to know intimately the effect of our tariffs on our foreign machinery trade, as well as the opinions of foreign buyers of our machinery. The majority of these manufacturers have been and still are protectionists, the *Machinist* says. Fifty-eight replies were made for publication; some others declined to express an opinion. The capital invested in the enterprises represented by the writers is, by their own statements, $35,326,000. They employ 21,636 men.

Of the 58 replies, 38 unqualifiedly endorse the passages regarding the necessity of reciprocity treaties taken from President McKinley's last address at Buffalo, seven endorse them qualifiedly and none disapprove of them; 34 declare they need no tariff on their own products, and two say they do need it; 42 would do away with or modify the present tariff on machine tools, while three say they would let it alone; 38 say that it does restrict our foreign trade in machinery, four think it does not; 24 express the opinion that foreign workmen produce no more per wage unit than is produced by American workmen, four declare that the American workman produces more per wage unit and one that the foreign workman produces most; 24 think that free raw materials would help foreign trade, seven think they would not.

In concluding its comment the *Machinist* says: "The Congressman or official of any kind that thinks he can afford to disregard the spirit that is behind these letters and that has inspired them is sadly mistaken. These letters do not represent campaign froth, but the deliberately and firmly fixed convictions of men of ideas and of great influence in the communities in which they live, and whom not to heed in a matter of this kind is to disregard the plainly spoken sentiments of the best informed business men in this country."

The Premium System Explained by its Author.

Mr. F. A. Halsey, of New York, delivered a lecture before the students of Sibley College, Ithaca, N. Y., on the premium plan of paying for labor which is reported in full in the Sibley *Journal of Engineering* for March. Mr. Halsey is the author of the premium plan and his exposition of this method of remunerating workmen and his replies to the criticisms offered by employers and workmen are worthy of careful reading by every one interested in labor problems. After a brief discussion of the features of the systems of paying for labor by the day or by the piece; payment in proportion to the amount of time consumed in doing the work or payment in proportion to the amount of work done, the lecturer proceeded to a comparison of these methods with the premium plan. The exact working of the premium system was illustrated as follows: A workman is paid (say) $3 a day and produces one piece of a kind per day—that is in ten hours. He is told that he will continue to be paid his $3 a day as before but that if he will reduce the time on the piece he will be paid in addition to his wages a premium of 10c. for each hour saved. If he reduces the time by an hour that hour represents in money value a gross saving of 30c. Ten cents of this amount is paid to him as a premium, leaving the remaining 20 cents in the employer's possession—this sum making itself manifest in the reduced cost of the work. If the workman goes on reducing the time in which the piece is made, the same process is repeated, each hour saved resulting in an increase in the workman's wages of 10c, and in a reduced cost of the piece of 20c. In other words the wages go up and the costs go down simultaneously, this apparently paradoxical result coming about from the fact that the gross time saved is divided between employer and employe, part of it going to increase the wages of the latter, and the remainder going to reduce the cost to the former.

It will be seen that, superficially, the plan has some resemblance to the profit sharing plan. The chief difference is that whereas the profit sharing plan treats the business as a whole and the workmen in a body, the premium plan treats each individual and his work separately. Under the profit sharing plan, the gross receipts at the end of the year are determined and a certain percentage of these is divided among the workmen regardless of individual merit, while under the premium plan each workman's earnings depend upon his own efforts.

One of the largest users of the plan—in Glasgow, Scotland—divides the value of the time saved by increasing the workman's rate per hour by the same percentage that he reduces the time—that is, if he reduces the time by ten per cent his hourly rate is increased by ten per cent and so for other rates of saving. Another English user of the plan considers it unfair to ask a slow workman who is paid a low rate of wages to equal the output of a rapid high priced workman before he begins to earn premiums. He therefore uses a highly ingenious method by which the base time is automatically extended in inverse proportion to the rate of daily wages—a $1.50 man, for example, being allowed just twice the base time that a $3 man would be given. The author's definition is this: "The premium plan is that plan or any plan by which the gains due to increased production by a workman are divided between that workman and his employer."

When it comes to the actual setting of the premium rates, the real difficulty is that, whereas if we have a fence to paint or a roof to shingle, we have a large body of experience to draw upon, in the matter of premiums the body of available experience is small. Mr. Halsey is satisfied that the tendency is to set the rates too high—that is, to set them so high that in the future the employer will be apt to find, as with piece work, that another workman would be glad to take the work at a lower rate, if that rate was guaranteed. The premium rates actually paid range between one-third and one-half the wages rates. The former figure for machine shop work the author regards as about right, but the latter, except in shops which were under a high state of efficiency before the adoption of the plan, is regarded as dangerous. In Mr. Halsey's use of the system in Canada the highest rate paid to men was one-third the wages rate, and it ranged from this down to one-quarter.

A. A. Fuller, of Providence, R. I., after several years' experience with the system at the Builders' Iron Foundry machine shop, had an opportunity to apply his experience and start anew at the Providence Engineering Works. At the last named place he adopted a fixed rate of 8 cents per hour for all machine shop labor—a rate which is one-third the wages rate for men getting $2.40 a day, and probably averages about one-third for the entire force. This method avoids fractions in the rates, and, moreover, it is divisible by 4. and inasmuch as time records are not kept more minutely than for quarter-hour periods, fractions never enter the premiums at all, which is a great convenience in the bookkeeping. Mr. Halsey's practice in Canada was similar to this, except that the rate was uniformly 5 cents per hour, and a second rate of 3 cents for apprentice boys.

Many objections have been raised to the plan, some based on fundamental or economic and others on more superficial or practical reasons. The most fundamental of all is the one which urges that the workman's time, as such, has no value and that it is economically wrong to recognize any value attached to it by a time-rate payment, the argument being that payment by the piece-work system, or its equivalent, is the only method that can be economically sound.

Stating the case fully it becomes: The employer's interests are with low wages *per unit of product*, while the workman's interests are with high wages *per unit of time*. There is no necessary antagonism of interest here, and under the premium plan the interests become nearly identical. If an employer, through the payment of increased wages per day, can secure reduced wages per unit of product, it is absolutely clear that the interests of both parties have been advanced. If there is any possible basis of united and co-operative action, this plan would seem to provide such a basis.

Then there is the man of large experience, who has grown gray in the management of men and of work. He says that the whole thing is chimerical—that it is a workman's duty to do a whole day's work and a foreman's duty to see that

he does it; that a competent foreman can tell if a workman is doing a full day's work or not, and that one who cannot tell is incompetent. Such a man will say, further, that if a workman increases his output under the premium offer it is because he was loafing before and that the last thing to do was such a man is to reward him for his previous loafing by raising his wages. The proper thing to do, he argues, is to get better workmen and competent foremen.

Mr. Halsey replies:

"The fallacy of this man's argument or statement lies in the limitations of his own training and experience. He has no knowledge of the magnitude of a day's work under incentives, and his appeal to his lifetime of experience is beside the mark. The men who have tried incentives and found them to fail (if there be any such) are entitled to be heard with respect, but the man who has not tried them can, in the nature of things, know nothing about their value. Moreover, granting, for the sake of argument, that a workman should do his utmost and that a competent foreman can determine if he does it, the situation is not changed. The real question is: Do workmen do their utmost and can such foremanship talent as is available determine if they do it? The question is to be decided not with reference to what ought to be, but with reference to what is—not with reference to conditions in an ideal world, but to conditions here."

Mr. Halsey concludes by saying: "If the industrial system of the world is, in a broad sense, simply the co-operative production and distribution of wealth, and if an increase in the total wealth produced, by giving more to divide, increases the amount available for each individual, then the general adoption of the premium plan can do nothing less than advance the prosperity of all."

American Packing of Export Goods Commended.

[London Engineering, March 7.]

It has been rulable for American consuls to send letters to the State Department at intervals, pointing out that American manufacturers are not sufficiently careful in packing their goods for export; that they suffered in this respect in competition with British and continental firms. It is interesting in this connection to note that in one instance at least American methods in the care of export goods have been held up as a pattern to British manufacturers. The New Zealand Loan & Mercantile Agency Co., Ltd., of London, writing to *Engineering* quotes as follows from a letter from one of its clients in New Zealand to whom it had shipped a machine manufactured in England:

"With reference to the mitering box imported by you for me, it presented on delivery the usual exasperating contrast to neat American methods exhibited by the British manufacturer —rough, rusty, half-painted, put together anyhow, and kicked at you, as it were, without the slightest rag of explanation or directions, and accompanied by a rough thing like a second-hand bullock yoke, which looks as if it had lain outside a country smithy for a couple of years or so, and the use of which we are utterly unable to understand; in fact, though well accustomed to machinery of various kinds, the way to use this thing has beaten the collective talent of the place altogether, and I must ask you to write to suppliers for directions for its use, keep and repair; for the intervening months it will probably remain as lumber. I do not know if the British manufacturer ever does deign to explain his products; my experience after a good many direct importations is that, if he is only prepaid, he is satisfied to chuck his stuff, minus two or three of its parts, into the first old kerosene case he can lay his hands on, and kick it at you as aforesaid. I have imported apparatus, etc., from the States also, and the contrast is most exasperating to an Englishman—everything spruce, smart, and complete in its place, paint complete, steel parts smooth and bright, every screw carefully supplied, copious directions, catalogues and literature generally, and the whole packed as if the customers, notwithstanding prepayment, were really worth pleasing with the result. This thing looks exactly as if it had been picked off a foundry scrap-heap and despatched by a scavenger for an old song; no screws are supplied, and Heaven only knows what other parts are missing, or what on earth the use is of those that are sent."

The exporting firm adds this comment: "Although several letters have been addressed to the manufacturers on the subject, thus far they have not replied to same, which is but another instance of the loose manner in which the British manufacturer treats his customers. We do not know that we need enlarge upon the above facts; suffice it to say that we frequently find orders going to America and Germany which formerly came to Great Britain, and we can hardly wonder at the change when we read such reports as the above."

Iron and Steel and Machinery Firms in the New Frick Building

With the completion of the Frick Building at Pittsburg, the corner of Fifth avenue and Grant street has become probably the greatest iron and steel headquarters in the world. Adjoining the Frick Building is the Carnegie Building and such companies of the United States Steel Corporation as have been unable to secure quarters in the Carnegie Building are now quartered in the Frick Building. While it is true that the financial end of the United States Steel Corporation is attended to in New York, the operating and sales departments of nearly all its companies are now located in the Frick and Carnegie Buildings. In addition other iron and steel combinations outside of the United States Steel Corporation have sought quarters in the Frick Building and nearly all of the tenants of this beautiful and massive structure are in some way affiliated with the iron and steel trade. The Carnegie Building houses the headquarters of the Carnegie Steel Co., American Steel Hoop Co., National Steel Co., American Tin Plate Co., H. C. Frick Coke Co. and all the allied interests in coke and coal lines absorbed by the United States Steel Corporation. The following concerns have moved into the Frick Building in the week:

American Bridge Co.
American Steel & Wire Co.
Crucible Steel Co. of America.
National Tube Co.
Standard Chain Co.
Allis-Chalmers Co.
American Nut & Bolt Fastener Co.
American Foundry & Construction Co.
Reed F. Blair & Co.
American Ingot Mould Co.
Brown Hoisting Machinery Co.
Babcock & Wilcox Co.
Central Plow Steel Co., Ltd.
Duff Patents Co.
Charles Dreifus & Co.
Duquesne Manufacturing Co.
Goff, Horner & Co., Ltd.
Garland Chain Co.
J. H. Hillman & Son.
Hunt Foundry & Machine Co.
Morgan Engineering Co.
Niles-Bement-Pond Co.
Oliver & Snyder Steel Co.
Robinson Machine Co.
Standard Steel Car Co.
Southwark Foundry & Machine Co.
Union Steel Co.
Spang, Chalfant & Co.
L. & R. Wister Co.
Pressed Steel Car Co.

The Largest Chain.

The Standard Chain Co., Pittsburg, Pa., has just completed at its Lebanon, Pa., plant the largest and heaviest chain ever forged. A duplicate of this chain is also to be made at this plant, the two being to the order of the Eastern Shipbuilding Co., New London, Conn. The completed chain is of 330 fathoms, each link being about 20 inches long. Heretofore these heavy chains have been made by English chain manufacturers, and when the contract for these two 22,000-ton steamers, to ply between Japan and San Francisco, was placed, it was doubted if any chain manufacturers in this country could produce a chain of such a large size. The Standard Chain Co., however, accepted the order and the chain has stood all the severe tests required by the British Lloyds Register Association. To test the chain a special testing machine had to be built at great expense, being probably the most complete and ingenious yet constructed. The Philadelphia Machine Tool Co., of Philadelphia, built the machine. According to the Lloyds Register the chain was subjected to a breaking test of 494,480 pounds, and before the links were broken they withstood a test of nearly 600,000 pounds. The chain is what is known as a cable chain of 3 3-16 stud link.

The Plant of the Bullock Electric Manufacturing Company and Its Work and Cost Systems.

The factory of the Bullock Electric Mfg. Co. is situated in East Norwood, about five miles from the business section of Cincinnati, and here in what seems to be a residence neighborhood the company has acquired a large tract of land and has built thereon one of the finest plants it has been the pleasure of the writer to visit, even in these days of industrial betterment. Well constructed buildings, a thoroughly equipped plant, extensive grounds, broad guage management, cannot but have an excellent effect upon employes if there is anything at all in the theories of sympathetic action. Comfortable and inspiring surroundings provide a direct stimulus to the best energies of the workman and these attempts to improve the environment at the Bullock Electric Mfg. Co.'s plant are to all appearances as successful as they are extensive. The continuance of these methods is sufficient to show that the company believes the endeavor to provide a pleasant place of employment, unusually cleanly and well lighted, is a paying proposition, and it is very probable that the conditions at such an institution are attractive enough to be an inducement to the highly trained mechanic to cast in his lot among such agreeable surroundings. Hence the firm does not seem to lack a source of supply from which to select additions to its force, and the power enjoyed in this choice results in the maintenance of a shop duty at a high potential. It is gratifying to see on all sides convincing evidence that the plan meets with the cordial approval and coöperation of the workmen and the night and day operation of the plant would indicate equally well a prosperous condition of the business affairs of the company in general.

FIG. 1.—WESTERN EXPOSURE OF THE BULLOCK ELECTRIC MFG. CO.'S WORKS.

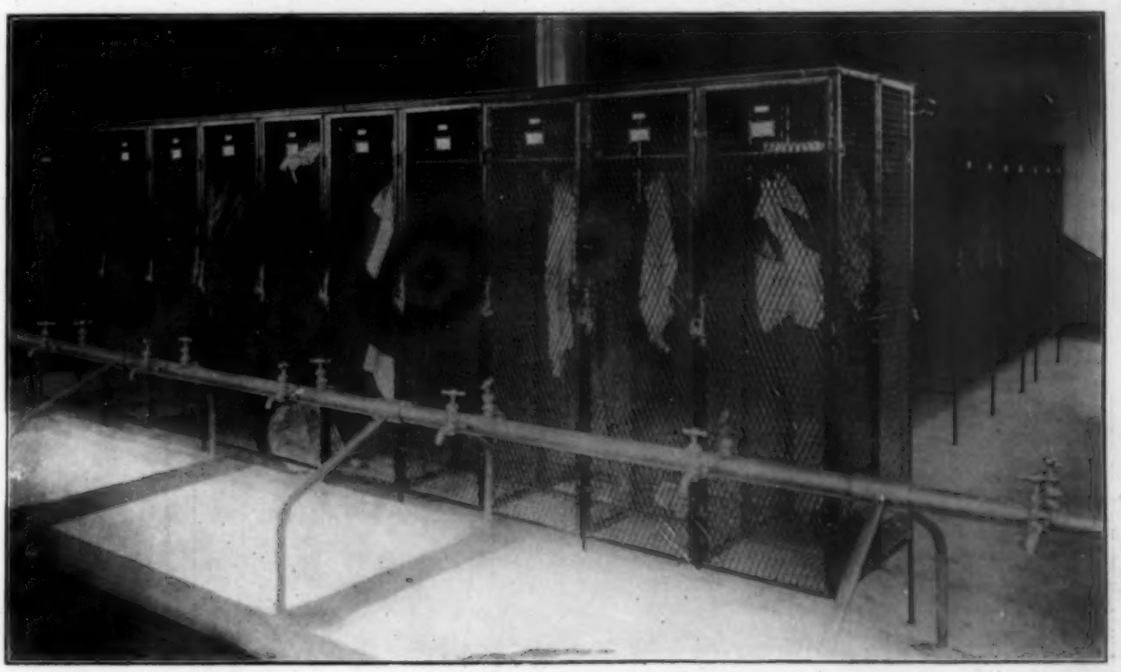


FIG. 2.—ONE SECTION OF THE LOCKER ROOM.

Shop Buildings and Betterment Features.

The buildings are constructed of a light colored brick with steel frame and glass roof, and as they stand some distance back from the main road present a striking appearance. The half tone, Fig. 1, shows the administration building to the right and the main machine shop on the left of the picture; immediately behind the office or administration building is the pattern shop and the brass foundry. At the present time a building at the right of the administration structure is in process of erection and the plan will then have a more symmetrical and possibly more pleasing effect. The administration building contains the general offices of the company on the ground floor at each side of the entrance. These offices are finished in hard wood and have glass partitions separating the several units. In the rear of the building on the same floor are the

store rooms for stationery and similar supplies for distribution upon receipt of the regular requisition from any department. Here are located the clothes lockers and wash rooms illustrated in Fig. 2, where a section of this latter department is given. The lockers, or clothes racks, are of metallic construction permitting thorough ventilation of the discarded clothing, and

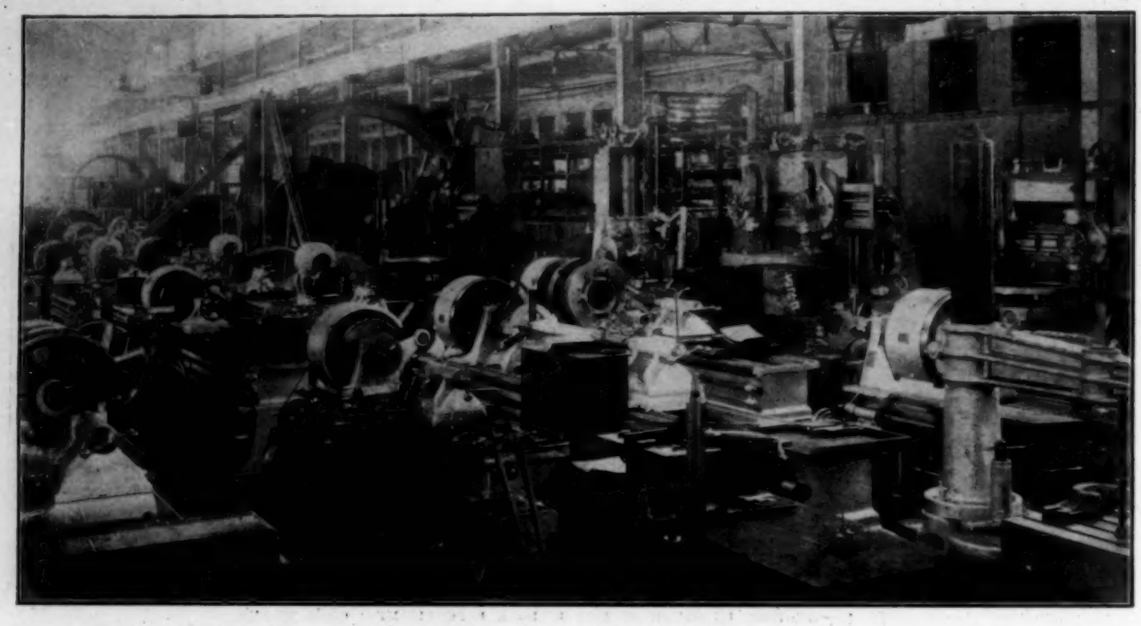


FIG. 3 —VIEW OF THE MACHINE DEPARTMENT.

the washing facilities include shower baths as well as the more familiar wash room apparatus; the running water permitting a finishing cut to be taken after the roughing down of the stock has been accomplished. Overhead in the next story are the lunch and recreation rooms, a piano, library and a reading room where current literature is kept on file, adding to the opportunities for quiet enjoyment of the noon hour. The library is supported by small contributions, the company donating an amount equal to the maximum receipts from the employes. Separate lunch rooms are provided for the men and girls in the service of the company.

Among the other social and economic features introduced by the firm, and which may be mentioned here along with the other betterment features, are: Reduced rates for employes who may desire to subscribe to periodicals; technical books, bicycles, machinists' tools, etc., at wholesale rates; an arrangement by which employes may secure fire insurance on their tools and have deducted a part of the agent's commission usually paid; a base ball ground on the company's property. The writer was informed that this is utilized by a base ball team of no mean ability and match games are in progress every Saturday afternoon during the summer season. There is a lunch room on the second floor of the administration building where the officials of the company gather at noon for luncheon and an occasional discussion of some matter of policy or business detail. The wall at one side of the room bears a blackboard for the graphic delineation of knotty problems in electrical transmission or some other equally abstruse subject—

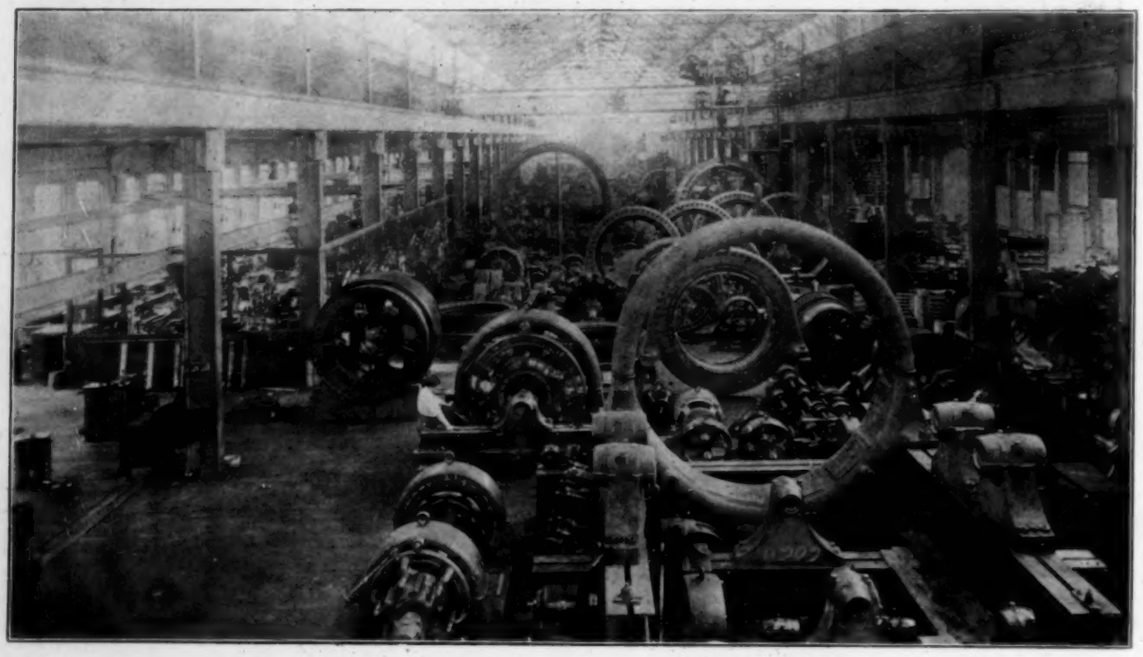


FIG. 4.—LOOKING THROUGH THE CENTER AISLE IN MACHINE SHOP NO. 1.

at least this is probably the intention of the individual to whom the idea may be credited.

The Time Clock No Respecter of Persons.

It seems that the scope of the time clock, which is very extensively utilized in the works, is broad enough to include the

office and no one is exempt from registering his time and number. The rush of business, with men who may not be permanently in attendance at the factory, results in a certain amount of laxity in the performance demanded by a strict adherence to the rules. A voluntary system of fines has been adopted for the non-observance of the time regulation and the delinquents

The Bullock Electric Mfg. Co. is not hampered by any lack of land for future development, the lot being 750x1,200 feet. Across from this site is the newly erected foundry in which the company has an interest. This is located on a triangular plot of ground, 600x600x1,300 feet, the building being 200x250 feet. Both pieces of property are adjacent to the railroad

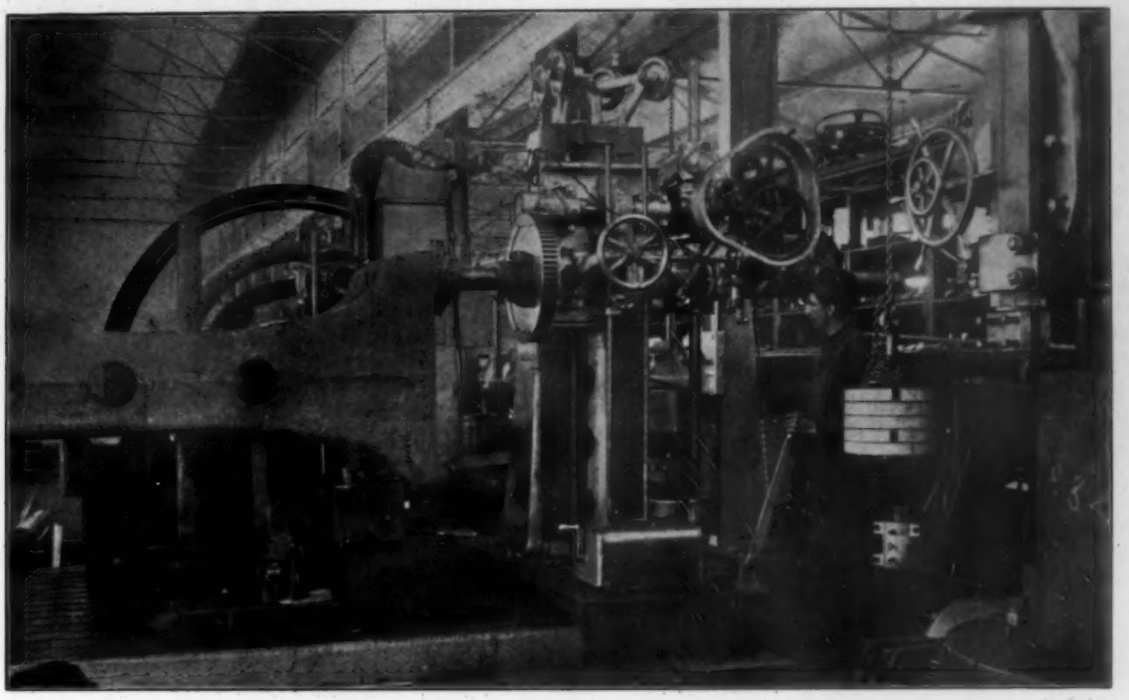


FIG. 5.—ELECTRICALLY-DRIVEN MILLING, DRILLING AND BORING MACHINE.

are mulcted accordingly for the benefit of a general fund expended usually in cigars for the lunch room. The blackboard serves admirably as a ready means of posting up the names

tracks and an electric trolley system is conveniently arranged for the loading and unloading of shipments. The tracks extend into the plant and by means of a general equipment of

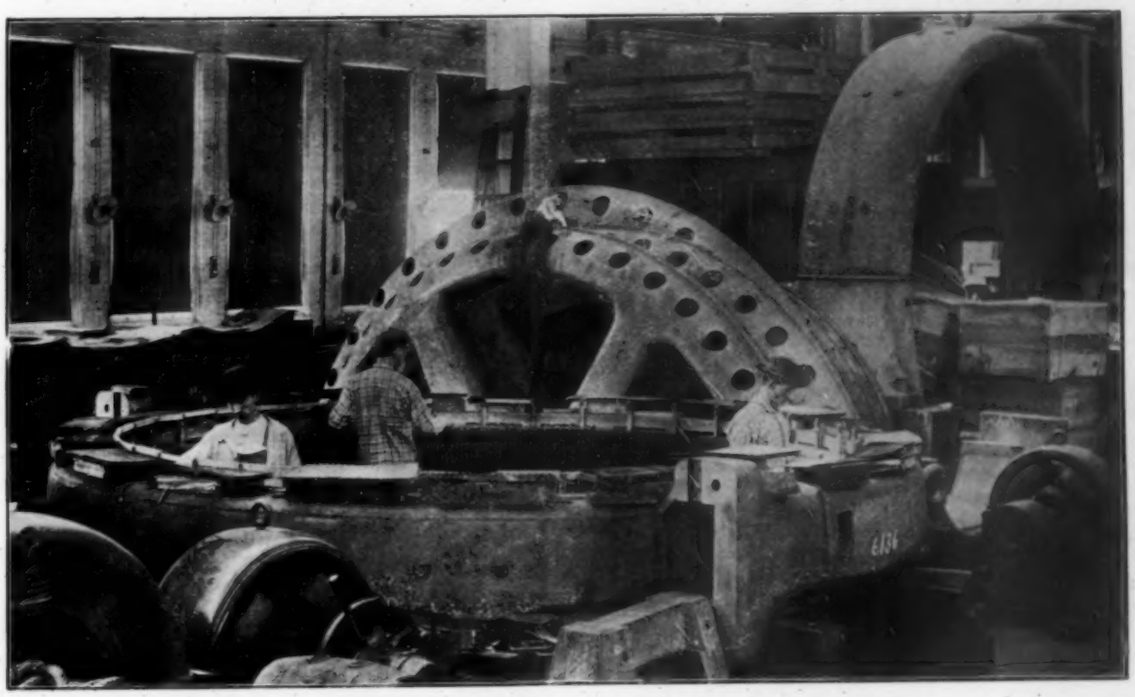


FIG. 6.—ASSEMBLING THE LAMINATED CORE OF A LARGE ALTERNATING-CURRENT GENERATOR.

and records of the forgetful, the list including some of the higher officials of the company, by the way. The second floor of the office building contains also the drafting room, about 60 feet long, engineers' department and the offices devoted to the collection and preservation of time, cost and premium records. A fire-proof vault is provided for the care of drawings, this room being about 15x8 feet.

overhead cranes the material in its different stages of manufacture is transferred to the several departments.

The Shops and Their Equipment.

One would naturally expect a very complete installation of electrical apparatus in a plant of this kind and it may be said at once that every available means has been employed to ob-

tain whatever advantage might accrue from the application of electric drives. Many of the applications of electricity to the driving of machine tools are reminiscent of the early days of the automobile industry when the designer was too timid to shake off the incubus of the horse, and slavishly followed the lines laid down by the builders of horse-propelled carriages. The electric motor for doubtless similar reasons has generally been taken in the light of an addition rather than a growth, an afterthought and not a well reasoned and appropriate component of the one design. Fig. 3 is therefore a pleasing variation from the average run of things electrical. This is a general view of the main machine shop and it shows the lathes, boring machines, etc., fully equipped with motors built in as integral parts of the mechanism. Special designs for the introduction of machinery of this kind must have been an expensive experiment, but it cannot but have a good effect upon every student of machine shop problems who comes within its influence. Take this view or the one shown in Fig. 4 where the spectator is looking down the center aisle and the finished parts, steel roof and the crane service are illustrated. Note the absence of belting and countershafts; and parenthetically the writer ventures to aver that one of the main impediments to

BULLOCK ELECTRIC MFG. CO.
SUB-ORDER.

General Order 6830 Date 2/6 '02
Machine Department
Number of Pieces 3
Operation Bore Face and Turn
Rear End Shaft
Pattern No. C 5377 Drawing No. 9314
No. Finished 3 Remarks
Foreman J Smith
This Slip is to be signed and returned to office when work is completed
APPROVED:
Estimated time 15 hours.
Ass't Supt.
Time taken 9½
Time saved 5½
H. Brown
Inspector.
THE IRON TRADE REVIEW

FIG. 7.—SUB-ORDER GIVEN TO WORKMAN WHEN ISSUING WORK.

machine shop efficiency is to be found in the maintenance of belting and its interference with crane service. The high degree of usefulness of a belt in good condition is not doubted; but the care bestowed upon it is as a rule so irregular and given so grudgingly that the sight of a machine shop so generally destitute of this element of ordinary transmission devices is decidedly suggestive of a new order of things. Most of the motors are mounted directly upon the main spindle or by a single reduction method. This naturally brings up the system of electrical transmission peculiar to the practice of this firm.

The Electrical System.

The power system is in the first place based upon two Cahall boilers of 250-h. p. each and from thence through direct connected units the resulting energy is transmitted to the motors in the plant. Every machine is driven by an individual motor and these demand some 400-h. p. Another boiler is to be installed to take over the burden imposed by the recent additions to the factory. The electrical distribution is arranged on what is termed the multiple voltage plan. The system starts with a generating set supplying three voltages, namely 44, 66 and 140 volts. Four wires are used in distributing the current throughout the works. Between the first and second wires there is a difference of 44 volts, between the second and third wire 66 volts and between the third and fourth 140 volts. The sum of the three is 250 volts and it is this voltage that is used to excite the motor fields.

The voltage which passes through the armature determines the speed of the motor, assuming that the field coils are constantly excited by a uniform voltage. Thus if 44 volts is employed then the speed would be proportional to that voltage. The next speed would be secured by using the 66 volt circuit. Then the sum of these pressures, 44 plus 66 or 110, can be utilized for the next step and for the fourth speed the 140 volt current is available; for the fifth, 140 plus 66 or 206 volts, and finally the sum of the three voltages, or 250. By means of the controller the connections may be reversed and the same speeds secured in a backward direction. For all of these changes the speed will be constant while the torque of the motor will vary according to the demands made upon it. This is one of the features that with this drive makes it perfectly feasible to turn such castings as spiders, or any similar pattern in which the tool runs in and out of the metal, without breaking or burning the tool. Whether this system in its power generation and conveyance to the machine does not have the addition of features more complicated and therefore less desirable than other systems is not any more evident to the view of the writer than is the remarkable simplicity of the connection at the machine tools. This is achieved without the aid of a rheostat and it is of course evident that the use of a rheostat for varying the voltage introduces resistance into the

No. of Workman 20 Name C Brown				No. of Workman 84 Name S Jones				No. of Workman Name			
DATE.	START.	STOP.	TIME.	DATE.	START.	STOP.	TIME.	DATE.	START.	STOP.	TIME.
2/6	12	5.45	4¾	2/7	7	12	5				
	C Brown				S Jones						

Totals should be added up and signed below by workmen. THE IRON TRADE REVIEW

FIG. 8.—FORM ON BACK OF SUB-ORDER, AS SHOWN IN FIG. 7.

circuit and cuts down the current. This is necessarily wasteful and interferes with the turning force or torque of the motor at the various speeds.

The controller in the case of a lathe is usually mounted upon the leg immediately beneath the headstock and is connected to a splined shaft operated by a crank located on the carriage, through the medium of bevel gears. The stem of this crank shaft extends down through the apron of the machine and always travels with it. This arrangement maintains the operating lever within easy reach of the attendant irrespective of the length of the machine or the travel of the carriage.

The several circuits are taken from the generators to the switchboard through vitrified conduits. Recording watt-meters are located upon this switchboard to show the total output of the generators at any given time as well as ammeters for each circuit to give instantaneous readings of the shop demand upon every branch of the mains. On this board are also located switches controlling the circuits throughout the works. The mains pass through conduits underneath the shop floor; one of these being located immediately between each of the side bays and the main aisle. They are formed by using one-half of a 24-inch vitrified sewer pipe cut in two lengthwise. The mains are suspended in these pipes in glass or porcelain insulators attached to hardwood cross pieces. Lead wires are run from the mains to each individual machine and placed in grooves in the floor, the grooves being covered by channel irons for protecting the wires. The conduits are covered by boards which may be readily removed and all the circuits are easily accessible for inspection should they require attention.

As the wires come from the floor to the machines they enter the terminals of a four pole switch and from thence pass into the controller. The controllers used in the shop are of the magnetic blow-out type, the magnetized core supporting the connecting buttons serving to rupture an arc at the instant of formation. The wearing parts of the controller are practically restricted to the removable fingers and buttons and these are not expensive and may be renewed by inexperienced help.

On the Machine Shop Floor.

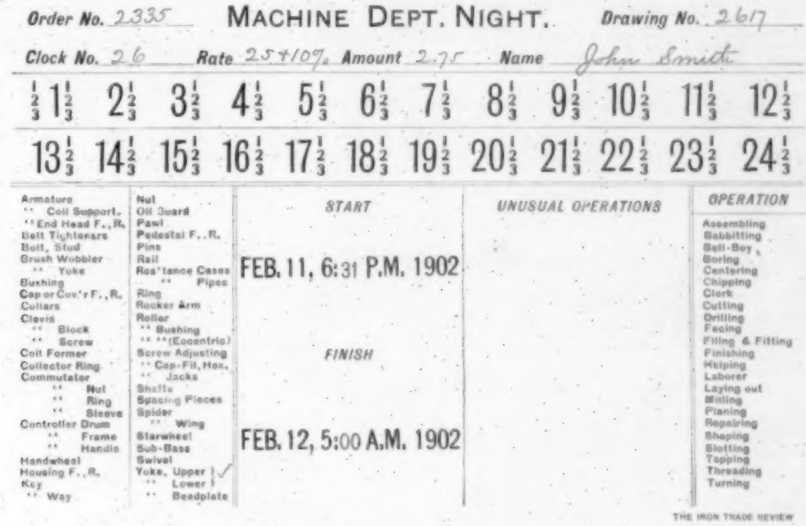
A portion of the machine shop floor is covered with heavy cast iron plates with T-slots for the handling of weighty parts. Fig. 5 shows a view in this section, the machine at work being a Niles milling and boring machine electrically driven. Fig. 6 suggests the extent to which the industry has progressed in the production of ponderous mechanism. The men seen in this illustration are assembling the laminated core of a large alternating current generator. On this floor the writer noticed several things among the smaller items of interest. Babbitt bushings are made with the aid of a shell mounted in pieces around a steel core; the outside of the shell forming the interior of the bore when the babbitt bushing is finished. The core is withdrawn after pouring the babbitt and the sections of the shell can then be removed, leavnig the oil passages neatly molded in place. This method saves considerable time and results in much more uniform work than if they had been cut out by the old time process. Some of the milling done in the commutator department is performed at a high rate of speed and, as is familiar to workmen generally, the particles of metal have altogether too much of a tendency to arrive in the eyes of the attendant running this class of machinery. A thin sheet of mica held in a metal case and loosely attached to the machine near the cutting point affords complete protection to the eyesight and at the same time does not interfere with the work, the mica and the metal frame being thrown to one side when the work is to be changed and the pivot permitting the frame to be at once returned when the machine again starts cutting.

An Adaptation of the Premium System.

The premium system of paying wages has been described in *The Iron Trade Review* at different times and the general theory and application has been frequently discussed. This fundamental consideration of the matter, therefore, may be laid aside for a brief account of the manner in which the method has been adopted at the plant of the Bullock Electric Mfg. Co. A proportion of the work is done on a premium basis, affording an opportunity to the expert machinist to earn considerably more than his daily rate. The day rate is paid, however, to all the workmen whether they earn the premiums or not. The premium system has been in operation for something over two years and the results have been quite satisfactory. Previous to the inauguration of the present plan the firm had determined on most of the time limits for each piece of work. This was obtained by consulting the old time records and securing the actual time consumed in completing the different portions of electrical apparatus. From these data the premium department has established numerous rules for the calculation of similar work, and this has made it easy to assign time limits for all new pieces of work as they were brought into the shop. The best results in the accurate determination of these time limits has been secured by combining the rules for calculation with the simple method of comparison of work, the one serving as a check upon the other.

When the work is issued to the shop, a sub-order, Fig. 7, is also given to the workman showing the time allowed on the job to which he is assigned. He is paid one-third of the time saved over and above the time limit set. In this case it will be noted that the estimated time is 15 hours, while the time taken is 9¼ hours. Thus the workman has earned one-third of the difference of 5¾ hours.

Whenever possible it is advisable that the one man should complete the work. This is not always convenient where there are two gangs of men, a night and a day force, and a good deal of friction may arise; as the day man figures that the night man is loafing and the night man is equally confident that the day man is slow. The back of the sub-order, see Fig. 7, is printed to correspond with the form shown in Fig.


Order No. 2335 MACHINE DEPT. NIGHT. Drawing No. 2617

Clock No. 26 Rate 25+10% Amount 2.75 Name John Smith

1/3 1 1/3 2 1/3 3 1/3 4 1/3 5 1/3 6 1/3 7 1/3 8 1/3 9 1/3 10 1/3 11 1/3 12 1/3

13 1/3 14 1/3 15 1/3 16 1/3 17 1/3 18 1/3 19 1/3 20 1/3 21 1/3 22 1/3 23 1/3 24 1/3

Armature
" Coil Support.
" End Head F., R.
Belt Tighteners
Bolt, Stud
Brush Wobbler
" Yoke
Bushing
Cap or Cov'r F., R.
Cutters
Clevis
" Block
" Screw
Coil Former
Collector Ring
Commutator
" Nut
" Ring
" Sleeve
Controller Drum
" Frame
" Handle
Handwheel
Housing F., R.
Key
" Way

Nut
Oil Guard
Pawl
Pedestal F., R.
Pins
Rail
Res'tance Cases
" Pipes
Ring
Rocker Arm
Roller
" Bushing
" "(Eccentric)
Screw Adjusting
" Cap-Fit, Hex.
" Jacks
Shafts
Spacing Pieces
Spider
" Wing
Starwheel
Sub-Base
Swivel
Yoke, Upper ✓
" Lower
" Beadplate

START
FEB. 11, 6:31 P.M. 1902
FINISH
FEB. 12, 5:00 A.M. 1902

UNUSUAL OPERATIONS

OPERATION
Assembling
Babbitting
Belt-Boy
Boring
Centering
Chipping
Clerk
Cutting
Drilling
Facing
Filing & Fitting
Finishing
Helping
Laborer
Laying out
Milling
Planing
Repairing
Shaping
Slotting
Tapping
Threading
Turning

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FIG. 9.—WORKMAN'S TIME TICKET.

8 and where two men are working at the one task it is filled out as shown and the premiums are paid proportionately to the amount of time each has taken on that particular job. This is equitable, of course, but if there is any lurking suspicion that the man who has taken the longest time has failed to keep up the same gait that the other fellow has maintained, then the man who gets the least proportion of financial return for his labor is apt to feel aggrieved. For this reason it is decidedly best that the men should start and finish each piece of work, but with double shifts of workmen this is not always practicable. The dimensions of the forms illustrated in Figs. 7 and 8 are 6¼x4 inches.

The premiums paid to the cheaper classes of labor are double those allowed to the expert machinist, and it is found that this allowance is productive of very gratifying results as the system offers an opportunity for a considerable addition to what would otherwise be a small compensation.

Workmen's Time Cards.

Fig. 9 illustrates the time card issued to the night force in the machine department. The order number, 2335, and the drawing number, 2617, with the operation to be performed, are entered by the foreman. The list of pieces and the statement of operations are, of course, different in each department. In this case we may assume that the work is the boring of the upper and lower yokes. On the left hand side of the time card the foreman brackets the two pieces as shown and

checks off the word "Boring" on the right hand side. Both the list of parts as well as the operations are given in alphabetical order and the check mark may be affixed at once. The system possesses considerable elasticity, more than one operation may be assigned; and a blank space permits the entry of any unusual work. It is preferable, however, that the work be limited as far as possible in order that the card and the sub-order may best serve as a shop time record, and this value of the card would be impaired if the job extended in several directions in the one period of time.

When the workman is ready for the time card, Fig. 9, a bell-boy takes the ticket to the clock stamp and the starting time is stamped on it. In this instance the line "Feb. 11, 6:31 p. m., 1902," is a reproduction of this operation. When the operation is finished this ticket is sent to the desk and a new card is given to the bell-boy and the finish time put on the old ticket and the starting time stamped for a new piece of work. Should the finish time not be stamped on the card then the time is charged to the end of the day or, if the time clock stamp shows he worked overtime, to the time the workman stopped.

The clerk receiving the workman's time ticket from the time department compares it with the clock slip from the time register and marks out the figures corresponding with the time shown by the stamp. This check is given by simply drawing the pen through the figures at the top of the time card and the arrangement in quarter hours is a convenient and rapid method of stating the limit. The clerk then fills in the rate, which in this case is a night allowance amounting to a 10 per cent increase, a rate given to all the night force at the plant. The workmen have only a half hour allowed for the meal at midnight so that from 6:30 p. m. to 5 a. m. gives ten hours. The night force works 10¾ hours per night, so that this man may have one or more tickets for the last three-quarters of an hour. The illustration, Fig. 9, shows the completed time ticket ready for filing in the cost department. The men use from one to ten tickets per day according to changes in the work. The average is about 2½ per man for all departments and there are twelve forms for different branches of employment in the factory. The time cards are, so far as this is practicable, of different colors.

"In regard to the amount of clerical work required for maintaining this system, I may say that two clerks handle the premium work of 150 employes and as yet our methods are quite imperfect. When they are improved there is no doubt that the clerical work will be greatly reduced. Every effort should be made to keep the men interested in the system, and in a friendly attitude toward it as, if they are not kindly disposed, its introduction will be useless. When once a time limit is set, under no circumstances should it be changed unless superior facilities for handling the work are provided. If the time limits are changed, it at once causes suspicion in the minds of the workmen and it then becomes no better than piece work, as the workman feels that if he cuts the time materially it will result in lowering the time limit on the next job."

It is of immense encouragement to all interested in this mutually agreeable method of paying wages to learn that the employes of the Bullock Electric Mfg. Co. earn on an average of 12½ per cent above their regular wages. Some earn as low as 5 per cent, while others as much as 25 per cent higher.

The workman's fortnightly report is shown in Fig. 10. This form is in the original 5¾x9 inches. It tells its own story and it is only necessary to point out that the last column serves to record the clock numbers of other workmen employed either on that date or at other occasions and affords a ready comparison of results attained by different employes engaged at the one task.

PREMIUM REPORT **BULLOCK ELECTRIC MFG. CO.,** From 1/15 '02 to 1/28 '02 Inclusive

For No. 36 Mch. Lathe Name J. H. Smith Rate 26

ORDER NUMBER	DRAWING NUMBER	PATTERN NUMBER	NUMBER OF PIECES	NAME OF PART	OPERATION	TIME ALLOWED	TIME TAKEN	TIME SAVED	PREMIUM $	PREMIUM CTS.	NUMBERS OF OTHER MEN
6823	7614	—	2	Comm Ring	Bore & Turn	14	9	5		42	
6509	7405	—	4	End Shade	Bore Fall & Turn	10	6½	3½		29	
6102	6319	—	5	Couplings	"	40	30	10		83	
6319	6257		2	Spiders	Boring	16	12	4		33	
"	"		"	"	Turn Face	30	23	7		58	
6617	9673		4	Comm Sleeve	Bore & Turn	60	12	3¼		27	48416

Premium Time Paid For 92½ Hrs.
Total Time Worked 108 "
Time Worked Not Premium Time — "

Approved for Payment S. Klein Prem. Clerk

Total Premium Amount Due 272 272 W. Wade Supt.

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FIG. 10.—WORKMAN'S FORTNIGHTLY PREMIUM REPORT.

Clerical Work on the Premium System.

One of the first inquiries in regard to the practical adoption of the premium plan in any plant is based upon the possible complication and the inevitable expense that attaches to the introduction of any system. The question may be answered in this instance by a repetition of a statement made by the head of one of the departments who has taken considerable interest in it.

Handling of Orders in the Shop.

The forms given in Figs. 11, 12, 13, 14 and 15 show the method of handling orders. Suppose an order has been received for a 25-h. p. motor from the branch office at Cleveland for shipment to *The Iron Trade Review*. The order is referred to the superintendent of the plant and after approval is entered in the general order book, a page from this book is given as Fig. 11. This form is 8¼x10¾ inches, allowing space for greater detail than is shown in Fig. 11. Here it will be proper to call attention to the fact that the forms, illustrated in Fig. 11 and subsequent engravings, are given merely as a guide and the entries are but so far complete as to give a clear idea of the actual use of the blanks. Seven copies of Fig. 11 are prepared on the typewriter in the production department for transmission to the other portions of the plant.

If the order is a duplicate of an old machine or an entirely new design there will be a specification furnished by the engineering department and the necessary data will be sent thence to the drafting room. The manner in which the drafting room would handle an entirely new design will be taken up later in briefly considering the work of that department. As soon as the essential data are received from the engineering depart-

ment a drawing list is made out in the drafting room for the clerks who prepare the bills of material, and with this information the clerks complete Fig. 12. Only one sheet of this bill of material is shown and it will be evident that the number of sheets will vary with the character of the machine. Two sets of these bills of material are prepared, one set being sent to the shop office and the other going to the cost department. The bill of material shows the parts required to make up the order and where they are to be obtained; whether from "D" orders, orders made up from stock, or whether from material that is in stock ready to be worked up or from material to be ordered from the outside of the plant. In the latter case a requisition is made on the purchasing agent calling for the material desired. The requisition is made out in duplicate as in Fig. 13; the full size of this form being 6¼x5 inches.

When the shop office receives the bill of material, the different items demanded by the form are separated for the use of the departments which handle the work and sub-orders are issued to the foremen of the respective sections of the plant, giving them authority to do the necessary operations on certain parts. One of these sub-orders is to be seen in Fig. 14. These are 4x6¼ inches and are issued in triplicate, the original sub-order being given to the workman who returns it when the task set forth on the face of the blank has been

termed a standard type of machine. If, however, the machine is an entirely new design the calculations will be made by the engineering department and complete specifications sent to the drafting room giving the necessary information. The drafting room employes having especial aptitude for certain lines of work are given the task of designing the new machine if it is a radical departure from existing types manufactured by the Bullock Electric Mfg. Co. In any other case it is turned over to the draftsman who usually does work of this order and this man makes the necessary drawings, in many instances using those made for former orders of the same general kind. On completing this work he prepares a list of parts which is known as the drawing list and this is employed in the writing out of the bills of material as previously described in following the orders through the shop.

Drafting Room System.

The orders in the drafting room are filed under three heads: Orders on which the drawing office work has not been completed are filed separately and they are not removed until all drafting operations are finished on that set. In the second file are retained orders on which the drawing office work is finished but the construction not yet completed by the factory. This classification shows the amount of work in process of

BULLOCK ELECTRIC MFG. CO.

PRODUCTION DEPARTMENT
WORKING ORDER.

Agent's Order No. 120-Cleveland

Customer's Order No. _____ Date 3/21/02 General Order No. 7569

Ship to Iron Trade Review,
Cleveland, Ohio.

Send B-L to above and Cleve. Office.

To be Completed by 5/21/02 Ship via Freight - F.O.B. Cleveland.

One (1) 25 H. P., 220 v., 470 r.p.m., Type N 168
open, shunt wound Motor.
No subbase.
No pulley.
No starting-box.
Make on this order taking parts from "D" orders.

FIG. 11.—PAGE FROM GENERAL ORDER BOOK.

performed. Fig. 7 shows such a completed sub-order, on its return to the foreman's desk, bearing on the back of the blank a record of the time spent on that particular job. This sheet is returned to the shop office by the foreman. The second copy of the sub-order is employed for the foreman's record and the third is used for a requisition blank when material must be secured from the stock room in order to complete the work for the part demanded by the order. The requisition sub-order eventually reaches the cost department directly from the stock room and serves as a check against the material which has been issued on this order.

On completing the machine it is inspected and placed in the testing room and subsequently is turned over to the shipping department, a record being made on the blank illustrated in Fig. 15. This form is 6x8¼ inches. Four copies of this shipping order are made at this time, one of them being retained by the shipping department, one is sent to the cost department, another is filed with the original order and the remaining copy is mailed to the selling agent to assist him in ordering parts for repairs, etc.

The Procedure with New Designs.

This is the usual procedure followed with what may be

manufacture in the plant. As soon as the orders are completed and shipped from the factory, notice is sent to the drafting room and the orders in the second file are transferred to another showing orders completed by the drafting room and the rest of the works. The orders for this last file are bound in heavy paper covers and deposited in the fire proof storage vault.

The drafting room uses four sizes of drawings, namely: 9¼x13 inches, 30x40 inches, 20x30 inches and 15x20 inches. The last three sizes are known as the B, C and D sheets. The small size, 9¼x13¼ inches, is the most commonly used; it is a printed form made from No. 18 bond paper bearing in prominent letters the name of the firm, the Bullock Electric Mfg. Co., the order number, material and number of pieces required. These small drawing sheets are also made from ordinary tracing linen for use where it is necessary to trace a part of an old drawing. Tracing linen is used for the B, C and D sizes. The small drawings are numbered consecutively, starting from 100. These drawings are indexed under three heads: the drawing number, the name of the piece shown on the sheet and the order number to which the drawing is made. The numbering of the B, C and D sheets is in another series commencing at 100, and each series is preceded

by the letters as C-260 and so forth. The small sheets are necessarily restricted to the delineation of a single piece and the larger sheets are only employed when the reduction in size would be inconvenient or it may be necessary to show the assembled parts. The drawing of but one piece on a single sheet requires more careful statements in regard to finish, fitting, etc., as the workman may not have an opportunity for seeing the part to which the one in hand is to be applied. All completed drawings are examined immediately after lunch every day. They are supposed to have already met the approval of the head draftsman and he and the superintendent and his assistant with members of the engineering force constitute the examining board. Each member, after approval of

ANALYZING COST OF MACHINERY MAKING.

BY OBERLIN SMITH.

Whatever may be the measure of truth in the commercial tradition of over 90 per cent of all the business enterprises that some into existence dying a more or less lingering death, without proving their fitness for permanent existence, or whatever the proportion may be, including those that die and tell no tale, it is probable that many of these wrecks owe their discomfiture to a non-realization of the actual cost involved in their operation. Hence in any business one of the most important functions of its bookkeeping department is to know and record the real cost of every article purchased or

A

BILL OF MATERIAL.

Signed [illegible] Date 3/22-02 Incomplete ____ Complete ✓

Order No. 7569

1 Machine. N168 Type. Motor-Generator. S.W. 25 H.P. 220 Volts. 470 R.P.M.

To be Completed 5-21-02

Remarks: Open - Shunt wound. No Sub-base - Pulley no Starter.

Additions and Changes. Date / Line / Issued

	Size of Arm.		Net Weight Arm.				Gross Weight Arm.		Machine Weight.		
	PARTS	Material	Size or Pattern Number	Quantity or Weight	Drawing Number	Date Org.	Date Rec'd	REMARKS	Weight	Price of Material	Cost of Material
1	Armature assembly				6058						
2	Bolts—machine										
3	" —stud										
4	Cap screws										
5	" "										
6	Head, front	C.I.	C1025	1	4706	D.[illegible]44					
7	" rear and coil sup.		C 2660	1	6147	D/271					
8	Keys—commutator		on shaft								
9	" —punching										
10	" —spider										
11	" —pulley	Cast	[illegible]	1	6055	[illegible]S Wire					
12	Nuts										
13	"										
14	Oil guard										
15	" wrench										
16	Pins										
17	Punchings #2	Steel	[illegible]	530	6548	[illegible]S Wire					
18	" end			2							
19	" ventilating			6							
20	" slot		[illegible]	37	4449	—					
21	Ring—split										
22	Screws—machine										
23	" —set										
24	Shaft	#3	[illegible]	1	6055	D[illegible]4		Complete with Keys - Nut & Oil guards			
25	Spider										
26	" wings										
27	Washers										
28	" lock										
29											
30											
31											
32											
33	Commutator assembly				4749						
34	Cap screws										
35	Lock washers										
36	Mica			[illegible]			[illegible]S				
37	Micanite										
38	Nuts } Shell Complete			1	4014	D.532					
39	Ring }										
40	Segments	Copper	Sec #58	111	7359	3/22		Length 5 3/16"			
41	"										
42	Segment rocks										
43											
44											

ORDER NO. 7569-1

FIG. 12.—BILL OF MATERIAL.

the work, enters his initials against the drawings marked on the drafting department bulletin. R. I. C.

The following is sent to the State Department at Washington by the United States consular agent at Gera, as one among several suggestions of ways of increasing our trade in Germany: "Our goods would experience an enhanced sale in many lines if they could be bought directly from stock kept on hand in foreign countries. This is especially true of articles not yet well known in the world's markets or which come from manufacturers who have transacted but a limited business abroad." One cannot repress the thought that if all consular literature showed this grasp of the King's English and this same depth of commercial wisdom, it would certainly not "experience an enhanced" value.

produced and the actual proceeds obtainable therefrom.

One of the most familiar instances of indeterminate ideas of cost is perhaps seen in the average country store—and sometimes in city stores also. In some of these places the idea of "profit" is simply the difference between the prices paid for goods in buying and those received in selling. The various items belonging to what the up-to-date bookkeeper knows, and very seriously studies, as "expense account," such as freight and traveling expenses in buying, spoiled and obsolete goods in stock and special discounts and bad debts in selling, are too often ignored by the optimistic shop keeper who, seeing a large percentage of so-called profit, feels proportionately happy in consequence thereof. Such other larger expenses as store-rent, taxes, insurance, heating, lighting, clerk-hire and

the value of the proprietor's time he will, of course, consider in a general way as coming out of the profits, with the hope that there will be some left. If the enterprise is one of those few which in the long run succeed, such success is in spite of the careless method of account-keeping employed, and certainly not because of any careful analysis of outgoing and incoming funds.

Before considering the cost of machinery, as the particular

BULLOCK ELECTRIC MFG. CO.

REQUISITION ON PURCHASING AGENT.

ORDER FROM _____ DATE 3/22/02

QUANTITY.	MATERIAL.	GENERAL ORDER NO.	TO BE DELIVERED BY
115	Piece pure hard drawn copper Sec #58 Dwg 7359 Length 5 3/16 Rush	7569	4/15

No. 27000 RECORD Issued by 4

FIG. 13.—REQUISITION OF PURCHASING AGENT FOR MATERIAL.

subject in hand, it may be well to look at some instances in general business, which show a tremendous variation in the relation of expense account to other items of outgo. An extreme case in the direction of minimum expense may be found in the street fakir who sells his goods upon some sidewalk, until a policeman drives him elsewhere, with no traveling expenses or rent, or spoiled goods or bad debts—in fact, with

BULLOCK ELECTRIC MFG. CO.

SUB-ORDER.

General Order 7569. Date 3/22/'02.

- Punch - Department.

Number of Pieces - 1 -

Operation _____

Front Head - C. I.

D 1544.

Pattern No. C 1625. Drawing No. 4706.

No. Finished _____ Remarks RUSH.

Foreman _____

This Slip is to be signed and returned to office when work is completed.

APPROVED.

Estimated time _____ hours. W. H. W.

Ass't Supt.

Time taken _____ "

Time saved _____ "

Inspector

FIG 14 —SUB-ORDER ISSUED TO FOREMAN

practically no expenses, except in some instances for paper bags to wrap his goods, and the one item of his own salary. This he is always content to rate at the amount that the net profits happen to be, and his account-keeping, usually entirely mental, becomes a very simple affair.

An Extreme Case of Non-Productive Expense.

At the other extreme we may perhaps find no better example than that of the patent-medicine man, who sells bottles of more or less agreeable decoctions for a dollar each, where the total expenditure for material and labor, including the really expensive components of the article, such as the bottle, cork, label, wrapper, etc., is doubtless in some cases less than 10 per cent. If the article is popular and sold in immense quantities, so that a good quality of water, roots and herbs can be bought at low wholesale prices, the ten cents may very probably cover the item of a fair profit as well as the various other expenditures. These, however, have consisted of such trifles as material, labor, factory expenses, etc. The one enormous item of expense account, which perhaps exhausts the remaining 90 cents, consists wholly of advertising, using this term in a general sense as including all selling expenditure, such as commissions to retail dealers, etc.

We see, therefore, that in business of various kinds the expense account may vary enormously in its relation to the simple and comparatively non-variable items of material and labor. A very large and certainly a most variable item in expense account is that of advertising. This term is here used comprehensively to include not merely newspaper advertisements, but the time and traveling expenses of salesmen, the sending out of letters and circulars, and all other means which are

Shipping Department

BULLOCK ELECTRIC MFG. CO. CINCINNATI.

Shipping Order 7569 From Stock Order _____

Sales Dept. Order 120—Cleveland Customer's Order _____

Machine No.	#730				
Type	N 168				
Machine	Motor				
Rating	25 HP				
Volts	220				
Amperes	———				
R. P. M.	470				
Armature No.	5395				
Brush Holders	8#9	20T			
Brushes	10#24				
Brush Jig	1				
Rheostat					
Starting Box					
Controller					
Resistance					
Pulleys					
Sub-base					
Diagram	H2114				
Net Weight	2480				
Gross Weight	2625				
Shipped on	7569				
Shipped via	Pan Handle	May 21	Prepaid		
Remarks	Shipped To The Iron Trade Review Cleveland O.				

FIG. 15.—SHIPPING RECORD.

taken to make known the goods to be marketed and to persuade people that they desire to buy them.

The Expense Factor in Machinery Manufacture.

In the making and manufacturing (note a difference between these terms) of machinery there will not be found so tremendous a variation in expense account as between the fakir and the medicine man; but in machine shops of various kinds, and working under the various conditions extant, there is a very considerable range of percentage in this respect. We see many small machine shops, started perhaps by ingenious and skilful ex-journeymen workmen with trifling capital, where the ideas of bookkeeping prevalent are much like those of the country store. Material and labor are considered the chief items, and good luck attends the business if the profits happen to be large enough to cover all running expenses and leave something over. The untiring energy with which many of our American machinists are endowed, when combined with business and mechanical ability, has made some of these shops into great and well-known manufactories. Such of them as have been the most successful have early realized the importance of careful account-keeping. Not many years since some machine shop proprietors thought it well enough to make expense charges to each particular article a certain percentage of the material contained therein. Other and wiser men included the labor, and put a "burden" upon each product based on a percentage of labor and material combined. Still

wiser ones omitted the item of material, which in its relation to labor is enormously variable, and added a percentage of labor alone. This, in many shops, it was found averaged as high as 100 per cent—that is to say, if a workman was getting 22½ cents an hour, another 22½ cents must be added, to be sure to cover all possible items of expenditure. This was not far wrong for jobbing work, the cost being 45 cents, which made the traditional 50 cents an hour charge, with its 10 per cent profit, seem fair and reasonable—that is, to the shop owner.

A careful study of the subject soon convinced many men of logical minds that this system was wrong, as it led to a burden of possibly 35 cents an hour on a high priced journeyman, while on a young apprentice boy it was but 5 cents. Each was perhaps running an equally expensive machine, but the boy was damaging it more than the man, whose machine was earning seven times as much to cover its repairs, depreciation, power, oil, house-room, lighting, heating, etc., as was the boy's machine.

A Uniform Burden On All Work.

A much fairer scheme, and one that in some shops is good enough to be depended upon and used as a general average, is to put a constant burden of so much per hour on all work, whether done by a high or low-priced workman. This matter the writer took up many years ago when operating a small machine shop, arriving at the conclusion that from 15 to 20 cents an hour was a proper burden to add to the wages of every workman, who was engaged in actually producing merchandise, the cost of which was to be ascertained. This cost, therefore, consisted of three items: First, material, at its lowest net market prices, delivered at the works where used. Second, so many hours as the aggregate work of a group of workmen at the different wage-rates employed upon the job. Third, so many cents per hour for these total aggregate hours. His experience showed that there were many times where 16 or 17 cents burden was sufficient, even with a small shop. Later on, and with larger works, the burden was usually fixed at 20 cents, and sometimes, when in commercially bad times the volume of output was small, as high as 25 cents.

How to Obtain the Expense Rate.

The method of obtaining this expense rate per hour is obviously quite simple. It can be best figured out by working upon a large chart (at the end of each year), on which are tabulated and classified all the hours made by all the employes of every kind during the year. All time made by non-producers, including such part of officers' salaries as cannot be charged directly to work paid for by customers, is charged to expense account. In this non-productive labor is included a considerable part of draughtsmen's wages, and all or nearly all of that of book-keepers, clerks and salesmen—also most of the time of tool-makers, and all of the time of enginemen, janitors, etc. Outside of wages and salaries we find, of course, some items of material, but these are comparatively small, being chiefly for maintenance and repairs of plant.

Among the large items which go to swell the expense account are interest, taxes, insurance, fuel, light, oil, advertising, traveling, various office expenses, such as postage, telegraphing, telephoning, etc., and last, but not least, bad debts. Akin to this latter is an item not always properly recognized, consisting of special discounts and deductions, given after goods are supposed to be sold at a certain price, usually on account of some complaint as to their quality, or some demand for alterations and repairs, which were not contemplated when they were contracted for, and which sometimes are due to improper use or abuse by the customer. All of the above named items of course add to one grand total of expense for running the establishment. If this amount is divided by the number of hours' work in the year applied to actual production, it will usually be found that the quotient, which is obviously the hourly burden, will be in our American machine shops somewhere between 15 and 25 cents.

It will be noted that the item of interest is a very indefinite one, as the concern in question may, on the one hand, have a heavily bonded debt with but few shares held by partners or stockholders, or, on the other hand, there may be no interest-bearing debt—the capital all having been furnished by the owners. In any case there is an expectancy of at least legal interest being paid to the bond-holders, should such there be, and a dividend of at least as much as legal interest to the partners or stockholders after proper salaries have been paid, and charged to expense account. It long ago seemed to the writer, therefore, that an interest charge of 5 or 6 per cent on the total capital of the concern should be included, instead of limiting it to such actual permanent debts as might be outstanding. This method is a safe one, if goods can be sold at what the books show to be even a small profit, one that will ensure fair returns upon the capital stock invested—as well as proper pay for services rendered.

Burden Calculated From Preceding Year.

The scheme in question has come in recent years more and more into favor, and in many shops has served an excellent purpose. It is desirable for its simplicity, and is good enough in cases where the work and the machines in which it is done are approximately uniform; and where the commercial expenses, especially those pertaining to advertising, are of about average proportion, and not too fluctuating. It is obviously difficult by such a system to know what the hourly burden is on current work, and the practice has usually been to fix a rate for each year based on the previous year's experience. This, of course, involves some risk, as suddenly changed commercial conditions might cause the shop to charge up an expense burden that was insufficient and thereby deceive its managers in regard to current profits. If, however, the burden is placed rather high, to allow for such contingencies, there is usually but little trouble, providing the business is reasonably uniform in character. It may be here noted that in the writer's experience an ordinary shop employing between 100 and 200 workmen and making several hundred kinds and sizes of machines of one general class, the average wage rate per hour has run for years at a time from 18 to 20 cents. It has so happened that the expense burden has been about the same, so that in this case an addition of 100 per cent to wages would have produced similar aggregate results, as before explained. There would have been, however, a very great discrepancy in regard to the real and apparent cost of certain machines, on account of their requiring an unusual amount of either extra high-priced or extra low-priced labor.

Within a few years past the imperfections of such a simple system as the one above outlined have been studied by various works' managers, with the result that many schemes have been evolved for more accurately ascertaining the real cost of their productions. Some few of these have been published in book form, and numerous magazine articles have been written regarding them. The writer confesses that he has not as yet given these new methods sufficient study to arrive at a conclusion as to the really best and most logical way to keep cost accounts, if such there be. Undoubtedly there is some simple and perhaps theoretically perfect way to keep accounts in certain manufactories with certain productions. If many hundreds of thousands of uniform articles are to be produced, such as reapers, sewing-machines, or guns, a good system of book-keeping must, of course, be contrived for each particular article, or rather for each component piece of such article. This is manufacturing proper, and not merely the making of machines, as in the case of the shop above referred to.

On the other hand, in the case of a machine shop which does general jobbing and repair work, making perhaps a few engines of various sizes and kinds, a few cranes, a few sawmills, and some boilers and pumps, each one varying to suit the customer's ideas rather than the maker's, then a very high class of intellect must be brought to bear upon the proper kind of book-keeping necessary for keeping track of each article; and it is a question whether, in the long run, all this will not cost more than it is worth. In such cases the old hourly burden rule is probably the best, differentiating, perhaps, the rate for the foundry, the boiler shop and the machine shop, respectively.

For all the shops which fall between these extremes, taking as an average the machine-tool works where a dozen or twenty kinds of articles are produced, with from 5 to 10 sizes of each kind, it is quite possible to contrive special systems of book-keeping which will add a different burden to the wages of an apprentice and a skilled workman, and which will fix a different rate for the service of a $5,000 planer and a $50 drilling machine. These, moreover, should fix a different rate of expense for times when the shop is crowded full of work, with

the production large, and for times the reverse of this, when perhaps a half force is employed.

Production and Distribution Costs.

The variations above mentioned, however, are comparatively simple to manage in regard to shop expenses. The real difficulty in arranging proper systems of cost-keeping is in separating the production and the distribution of the goods manufactured. In some cases these two great departments are automatically divided by keeping separate sets of books. One of these would pertain merely to the manufactory in the country, with no commercial expenses, except a little book-keeping in connection with hiring and paying labor, ordering and paying freights on material, etc. The other book-keeping would be performed at the city office, and would pertain to selling only, the manager of this department working as would any other merchant, but buying his goods at his own factory and selling them to the public. His expenses might vary enormously, according to the amount of advertising that was found necessary for different classes of goods, or at different times of commercial prosperity. In the long run, however, the expense accounts of both establishments would have to be charged up as items of actual cost.

The factory expense burden would naturally be very uniform, and, theoretically, the manager would merely have to receive and charge up such materials as were sent him, and pay such wages as were necessary. We may imagine him standing his finished articles in a wareroom of indefinite magnitude, and suffering no violent fluctuations in the peaceful tenor of his existence. As a matter of fact, however, most of

FIG. 3.—AUTOMATIC BOLT-THREADING MACHINE.

our manufacturers cannot thoroughly separate their commercial and mechanical departments; and hence some logical and comprehensive system of cost-keeping, applicable to various kinds and volumes of work, and made so flexible as to divide the burden upon each article produced, according to the fluctuating conditions occurring both in the shop and in the commercial world would be an extremely desirable tool to be put in the hands of a modern manager. He lives in a time of intense commercial competition and of strenuous mechanical effort, where small items must be carefully considered, and where enormous reductions of cost can be made by the standardization and unification of the articles produced. A large factor in this is the specialization of gauges, jigs, cradles and other tools necessary to make the goods cheaply. The temptation to use such tools is a strong one but their expense is usually very great. The balancing of the benefits and evils of their extensive use has, therefore, become a problem to be solved only by the wisest works proprietors.

Should it appear to the reader that the above remarks concerning cost-keeping seem to tell rather how not to do it than how it can be done, then the writer can only feel that the hints here given may possibly incite to more earnest effort some of those who are working in this field, as well as others who may in future enter it. Surely something may yet be evolved which will prove comprehensive enough to form a universal and standard system of cost-accounts.

Automatic Nut-Tapping and Bolt-Threading Machines.

Two automatic machines manufactured by the Acme Machinery Co., of Cleveland, are shown in Figs. 1, 2, 3 and 4. Fig. 2 is a sectional elevation of the nut-tapper shown in Fig. 1 and Fig. 4 is a similar view of the bolt threader illustrated by the half tone Fig. 3. Both machines are thoroughly automatic and have a remarkable simplicity about their construction which is a refreshing departure from the average design of mechanism of this class. The substitution of a machine for the act of a human agent is often obtained only by a complicated construction which seems fated to need frequent adjustment and repair and this necessity for skilled attention to be given to the machines increases with the number of combinations embodied in the working operations.

Tapping a nut is not nearly so simple an affair after all; it is in reality a work calling for a series of tasks when the demands of the case are clearly analyzed. The picking up of a nut from a pile of others, the holding of the one nut in a vise, chuck, or similar convenience, the presentation of a tap in

FIG. 1.—AUTOMATIC NUT-TAPPING MACHINE.

alignment with the opening through the piece to be tapped, provision for turning the tap through the nut while the latter is securely held, the withdrawal of the tap, release of the nut and its disposal along with the rest of the finished material, is a brief outline of the apparently simple process of tapping a nut. When this is undertaken by machinery, care must be taken that the machine will attend to the lubrication of the work, that it will select nuts with holes in them and that these will be the correct size, etc. It is not asserted that this is any more than a general list of the operations in the tapping process; even the hand-operated method will require careful supervision with possibilities of the human factor interfering with the success of the best laid plan. The bending strain brought upon a tap by careless handling is sufficient to break it down at the threads or the shank; and the adoption of jigs, tapping devices or machines, does not always avoid this tendency to destruction. The two machines here illustrated have been perfected recently to overcome these objections and at the same time give a largely increased output due to the multiple spindle arrangement, the completeness of the work and the minimum care and attention required for successful operation at high duty,

turning out tapped nuts for example at 2c per thousand.

The two machines have many points in common and as far as possible the same reference letters are used for identical parts of the mechanism. We will begin, however, with the nut-tapper, Figs. 1 and 2, and it will be seen upon inspection that the bed is made in box form and that the principal parts of the working mechanism are enclosed in it. The feeding device for the nuts is placed outside and on the top of the box bed to render it easy of access to the operator. The working parts of the driving mechanism being placed inside of the main bed, away from the point where the tapping lubricant is applied, prevents the oil or other lubricant used in nut-tapping from being thrown on to the main bearings, gears, etc. The machine is driven on the planer plan through the medium of the pulleys attached to the shaft at A; a worm is formed on this shaft which in turn drives a worm gear B, the latter having T-slots in the side of the rim for studs which come in contact with the finger C on a sliding rod operating the belt-shifter across the face of the fast and loose pulleys on the driving shaft. The contact of the studs in the rim of the worm gear B with the finger C alternately drives the machines fast and slow and by crossing the belts in the usual manner the one motion may be performed in an opposite direction to the other so that the taps can be withdrawn at a higher speed. On the hub of the worm gear B is clamped an arm, having a split hub for ready adjustment. By means of a suitable lever hinged to the sliding block D this arm can engage with the block and give it an intermittent motion to the left feeding a nut.

The nuts are in the first place deposited by the operator in the circular case E at the extreme top of the machine; this receptacle is divided into a series of cells by a number of radiating webs similar to the spokes of a wheel. The bottom of this casing is a separate casting F from the remainder of the nut cylinder and in the disc or plate is cut a hole exactly the size of one of the compartments in the part E. The vertical shaft driven by the bevel gears turns this slowly and, at intervals, a single cell full of nuts is discharged on the revolving plate underneath. This plate G is driven rapidly and the centrifugal force carries the handful of nuts to the outer edge of the plate where they at once find their way into the four nut chutes leading to the taps. The curves of these nut runways have been formed with special attention to the best shape for affording a quick release to the imprisoned nuts, and the present design is a considerable improvement over the earlier chutes. The nuts on passing down the runway fall eventually in front of a reciprocating rod attached to D by a relief spring. This rod is placed at right angles to the lower end of the nut chutes and serves not only to push the nuts in position for tapping but the same action ejects the nuts after they have been tapped.

The tapping is accomplished by four vertical spindles driven by gearing directly from the main shaft, as in the ordinary nut tapper, with the difference, however, that in the one case the taps run downwards into the nuts under the pressure occasioned by the weight of the spindles. In this case the taps run upward into the nuts guided by lead screws running in pairs of split nuts at the lower ends of the tapping spindles. When the machine is running in the direction that sends these tapping spindles slowly upward, the taps will be running into the nuts and when the desired depth has been reached, the belt snifts and the machine reverses, doubling its speed as the taps back out of the nuts. This cycle of running up and down completes the tapping of four nuts. The tap spindles are tool steel, ground, running in hardened and ground tool steel bearings. The lead screws and split nuts are also tool steel. These last are placed in an ingenious case at the bottom of the spindles so that in case it becomes necessary to take them out, by loosening a set screw the whole case may be reversed and the fastening screws at the back of the case can be reached as readily as those at the front. All gears are cut from the solid and all bearings are made of tool steel or bronze.

A steady stream of lubricant passes through a flexible tube to a point directly above each tap and nut and is discharged into a chamber L from whence it is led through the pipe M into

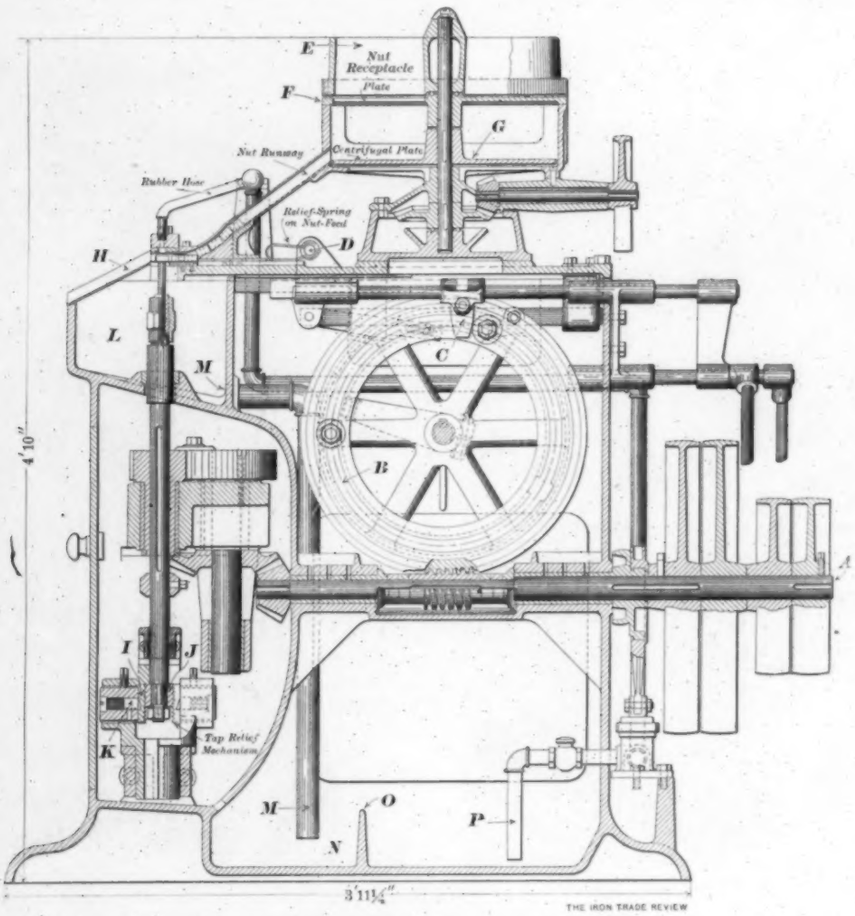

FIG. 2 —SECTIONAL ELEVATION OF NUT-TAPPING MACHINE.

a settling trough N in the base of the machine. The chips and grit settle and the oil flows over the edge of the rib at O. The oil is pumped up from this latter chamber and again distributed to the taps by way of the pipe P.

The desirability of providing a safety action in any tapping device has already been touched upon and the means employed for relieving the nut feed in case that a ragged nut or a piece of scrap gets in the way of the nut feeding mechanism may now be described. It will be seen that the stud at D is connected with the feed rod by a U-spring with clips fitting the round portion of the stud. When any obstruction gets in the way of the feed rod, the pressure between the two halves of the spring is sufficient to force them apart and the stud is then free, the mechanism automatically throwing itself out of gear with regard to the one chute only until the impediment is removed. The machine is furnished with another relief to prevent breakage of the taps when a blank or solid nut is presented to the tap.

At the lower ends of the tap spindles is a split nut I fitting a thread cut on a collar J fastened to the spindle. A spring actuated pin K fits in each half of the nut in a wedge-shaped cavity. When the tap strikes a solid nut, the split nuts holding the lead screws being retained in position by spring pressure only, begin to travel downward as soon as the taps reach the obstruction, thus relieving that particular spindle of the necessity of traveling upward. Both the nut feed and the tap drive are entirely automatic the moment the defective nut has passed out of the way, forced out of position by the on-coming nut or removed by the attendant; the machine at once brings the mechanism promptly to its proper position to go on tapping. When the tapped nuts are ejected by the machine they find their way across the drainage plate into the discharge chute that conducts them into a convenient receptacle. The discharge chute may be made so that the finished nuts can be delivered on either side of the machine.

The taps used in the machine are of the simplest form with plain round shanks. A small door at the left of the machine gives access to the adjusting mechanism for regulation of the depth to which the taps may be driven before reversal. The machine is capable of tapping 5-16 and ½-inch nuts with the intermediate sizes; the rate of production being equivalent to 160,000 ⅜-inch nuts in ten hours from ten machines with one attendant.

Figs. 3 and 4 show the automatic bolt-cutter manufactured by the same company. This machine has a strong family likeness to the nut-tapper and it is therefore only necessary to call attention to the particulars in which the two are essentially different. The threading is accomplished by two vertical spindles having die-heads and dies of the type known as the solid-adjustable. The bolts are placed by the operator in a hopper E on the top of the machine. This is of an inverted V-shape as shown by the dotted lines in Fig. 4 and on each side is a vertically sliding runway F which receives an oscillatory motion from the connecting rod H attached to the crank on the hub of the worm gear B. The two runways hold the bolts by the head as they are fed by gravitation into the machine. Should one of the bolts fail to fall in a correct position, the arms of the spider H will come in contact with the projecting bolt and throw it back into the hopper E. The feed motion at D is practically the same as the one applied to the nut-tapper, the vises automatically closing on the bolts immediately after they are centered over the die-heads. There is a bolt feed relief and a die-head relief to take care of defective bolts.

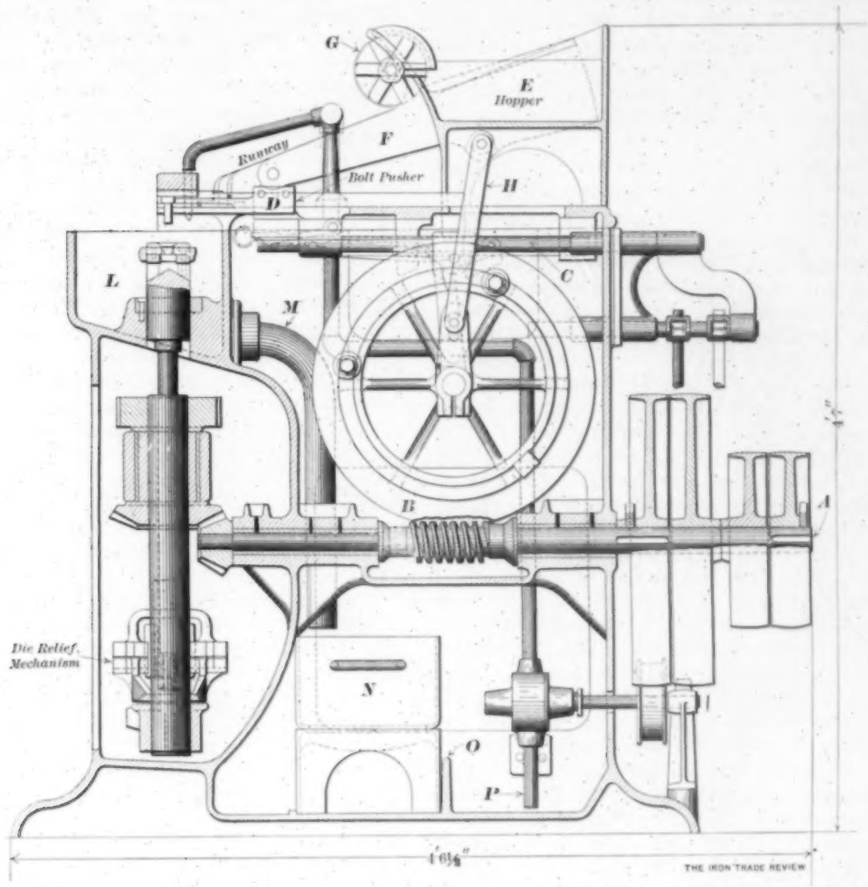

FIG. 4.—SECTIONAL ELEVATION OF BOLT THREADING MACHINE.

The machine illustrated has a capacity from 5-16 to ½-inch diameter up to 4 inches in length. It handles bolts with any kind of heads except T-heads; the latter cannot be retained in the bolt slots or runways. The daily production is equal to 80,000 ⅜-inch bolts in ten hours from ten machines and one operator.

The first shipment of 800 tons of rails placed with German steel manufacturers by the Louisville & Nashville railroad will arrive at Pensacola, Fla., shortly. The entire order placed calls for the delivery of 25,000 tons this year.

The foundry and machine shop of the Island Machine Co., at Skowhegan, Me., has been purchased by W. E. Hackett and L. L. Witham and will be continued under the present firm name.

CLAYS AND CLAY CRUCIBLES.

BY PERCY LONGMUIR.

Clays of the older formations, having lost their water of compination, are found in a hardened form known as shale or slate and therefore do not possess much interest to the metallurgist. He is chiefly concerned with the clays of the carboniferous period, although owing to the fact that the formations of this period also contain the workable coal and iron supplies, it may be that the clays, owing to near proximity, have received more attention than those of other periods. Clays are formed by the decomposition of such rocks as granite and consist essentially of silica, alumina and water in combination with varying impurities such as lime, magnesia, soda or potash.

Clay is therefore a hydrated silicate of alumina and is represented by the formula, $Al_2 O_3$ 2 Si O_2 $3H_2$ O, with a theoretical composition of silica, 46.5 per cent; alumina, 39.5 per cent, and combined water, 14 per cent. It is on the presence of the chemically combined water that the plasticity of a clay depends. Heated to any temperature below 100° centigrade the hygroscopic water of a clay is expelled, but when heated to a temperature over 100° centigrade the water of combination is driven off and the clay then losses all plasticity. This property is not recovered again, the clay being technically known as "burnt."

Fire clays may be defined as those clays which at furnace temperatures do not soften or fuse, and they belong to the neutral group in a classification of refractory materials contained in a previous article. They form an important class of refractory materials and meet with a very extensive application in industrial metallurgy. They are met with in many forms of furnace construction and are used extensively in the manufacture of fire brick and crucibles. After mining and picking over, the clays are weathered by exposure to the atmosphere for some time; they are then ground to an impalpable powder, in which condition they are ready for the furnace builder, crucible or brick maker.

In making up the bricks mixtures of clays give better results than are obtained by using a single clay only. They are molded in the usual fashion, air dried and kiln fired care being taken to both heat and cool the kiln gradually. The combined water is expelled and a hard, compact brick is the result. Furnaces built of these bricks must be set in fire clay tempered to the required consistency with water.

The theoretical composition of a clay is seldom met with in nature, the nearest approach being that of China clay or kaolin. The impurities to be guarded against are lime, magnesia and the alkalis, soda and potash. The two latter should in no case exceed 1 per cent. If higher than this the refractory or heat-resisting property of the clay is seriously impaired. When examining a new brand of fire clay the four impurities already quoted should be estimated together with the amount of oxide of iron present and a physical test made. This is readily done by molding cubes of the clay in question, taking particular care that the corners are kept square, and submitting them to a temperature just a little higher than that which in actual practice the clay will have to meet. The appearance of the corners and edges after this treatment will give a very fair index of the heat resisting qualities of the clay. Analyses by the writer of four typical fire clays are given below:

	1	2	3	4
Silica	46.30	63.30	52.00	47.60
Alumina	40.00	23.30	36.00	31.40
Magnesia	0.40	Trace	0.50	1.10
Lime	0.40	0.70	0.80	1.00
Ferric oxide	0.27	1.80	2.00	3.40
Combined water	12.67	10.30	9.00	10.60

Crucibles made from mixtures of fire clays similar to the above are extensively used for the production of cast steel. The objection to plumbago crucibles, from a steel making point of view, lies in the amount of carbon taken up from the crucible, which in the case of mild qualities may render the metal unfit for the purpose intended. To a certain extent this carbonizing action can be allowed for in making up the charge, but experience proves that the action is quite variable and the amount of carbon taken up by the steel is not by any means a constant quantity. With both plumbago and clay crucibles a certain amount of silicon is reduced from the silica of the clays employed in the manufacture of the crucibles and taken up by the steel. The effect of melting in a clay crucible is shown by the following analyses in which for clearness the carbon is assumed to be constant:

	Theoretical Composition.	Practical Composition.
Carbon	1.140	1.140
Silicon	0.025	0.140
Manganese	0.600	0.320
Sulphur	0.010	0.020
Phosphorus	0.021	0.021

The theoretical composition was obtained by calculation from the analyses of the materials charged and the practical was obtained by analysis of the resulting ingot. The decrease in manganese and increase in silicon are due to the formation of a silicate of manganese which in turn is reduced, the manganese passing off into the slag and the silicon entering into the steel. The increase in sulphur is due to the sulphur dioxide given off by the coke. Phosphorus in all cases remains fairly constant. In practice it is usual to estimate for a loss of 45 per cent in manganese, an increase of about five times the content of silicon and the sulphur will about double. This increase of sulphur depends chiefly on the quality of the coke used as fuel. Carbon loses usually about .05 per cent, but this loss is made good by the coke dust employed in the manufacture of the crucible.

Crucible mixtures invariably consist of three or four clays of differing qualities to which is added more or less coke dust. Four such mixtures are given below. They have yielded good results in practice and are made up from the clays of which the analyses have been already given:

	a. Per cent.	b. Per cent.	c. Per cent.	d. Per cent.
Clay, No. 1	10	20	21	35
" " 2	43	40	20	0
" " 3	21	17	35	20
" " 4	21	17	14	30
Coke dust	3	6	10	15

The mixture a gives a crucible specially useful for research work and one that will throw very little carbon or silicon into the steel. The mixture takes much more working up than do the three following ones and its chief use is that already indicated, for purposes of original investigation or for the production of nearly pure iron.

Mixtures b and c are especially useful in ordinary works practice. They make up into pots that will stand a fair amount of handling and only part with normal amounts of silicon, at the same time, other things being equal, yielding cast steels of good quality.

Mixture d is suitable for making up into a crucible that will have fairly rough usage to meet and it therefore finds its chief place in the production of metal for steel castings. It throws more silicon and carbon into the steel than do the three preceding ones, but is a strong pot and will give four heats. The working life of an average clay crucible is represented by a day's work of three heats.

Clay crucibles for steel melting are in the majority of cases made by hand, and one man locally termed "pot maker" is employed to each set of 12 melting furnaces. To keep the furnaces going he has therefore to turn out 24 pots per day. Uniformity in texture of the clays employed is one of the first essentials and this is attained by suitable grinding and sifting. The necessary amount of each clay and also the coke dust to make up a batch of 30 crucibles are weighed out and mixed together in a suitable floor tray. Water is added to bring the mass to the requisite consistency and the whole well kneaded by treading with bare feet. It is essential that the mass be well incorporated and therefore the "treading" process must be very thoroughly carried out until the clays arrive at what is technically termed "nature." For 600 pounds of clay this treading occupies about three hours but varies according to the mixtures employed. For instance the mixture a takes far more treading than does the one marked d.

The clay is then cut up into blocks of 29 pounds each in weight. These blocks or "balls" as they are technically termed are worked by hand on a slab and given a rocking and twisting motion until thoroughly free from air bubbles. An experienced man can tell by the feel of the ball when the air bubbles are all expelled.

The apparatus required for making these crucibles by hand consists of a cast iron flask, the inside of which corresponds to the outside form of the crucible, and a plug or core to give the inside of the crucible. The inside of the flask is finished dead smooth. The bottom plate of this flask is loose and

through the center a small hole is bored. The plug may be of cast iron, cored out inside to lighten it, or it may be of very hard wood. In either case the outside is finished perfectly smooth. In the bottom of this plug and fairly in the center a pin is inserted corresponding to the hole in the loose bottom plate of the flask. Both flask and plug are well oiled to prevent the clay sticking to the molds. One of the aforementioned balls of clay is dropped in the flask and the plug inserted and centered by means of the center pin. This plug is then hammered home by a few blows from a large wooden mallet and the clay so forced up between the inner and outer molds. The plug is given a dexterous twisting movement and is withdrawn. The flask is lifted by means of two trunnion handles onto a post fixed in the floor, and slid downwards, leaving the crucible standing on its bottom plate on the post. The top edge of the crucible is finished off and the top diameter lessened a little by drawing it in towards the center. Two sheet iron clips are placed around the crucible and it is carried away and stored in a warm atmosphere to harden.

When hardened the crucibles are placed on shelves fixed round the melting house and left for two or three weeks. Before using they are annealed overnight in a slow fire. Annealing grates are built to take 24 pots and these are packed up and fired each afternoon, so as to be ready for the following morning. The weight of a newly made crucible averages 29 pounds, on air drying 25 pounds, and after annealing 21 pounds. In addition to the crucibles, covers and stands are made, usually of a cheaper mixture of fire clay. The covers are dish-shaped and are used in some measure to protect the contents of the crucible from adverse influences. The stands are conical about three inches high and are used to raise the crucibles above the furnace bars. They serve a further purpose, namely, that of stopping up the hole left in the bottom of the crucible by the center pin of the plug. To insure this the pots are "sanded"; that is, after placing on stands in the furnace a handful of sand is thrown in the bottom of each one. This sand selected as being fairly fusible effectively binds crucible and stand together.

The life of these crucibles, as stated earlier, is usually three heats, though with special mixtures of clays they may be worked to give four heats. But in no case do they exceed this number, that is, of course, in actual steel melting practice. In the foregoing description of the manufacture of clay crucibles no mention has been made of mechanical appliances. The process is essentially that inaugurated by Huntsman, the founder of the cast steel industry, and in the manner indicated crucibles are made in many establishments turning out some of the most noted qualities of crucible cast steels.

Officers of five brake shoe companies announce to the trade on behalf of their respective companies that the American Brake Shoe & Foundry Co., with temporary offices at 26 Cortlandt street, New York City, has assumed control of the brake shoe output of the plants at which the following types of brake shoes are made: the Sargent Skeleton Steel, the Diamond "S," the Skeleton Steel Insert, the Lappin Steel Back, the Streeter Steel Back, the Corning and the Ross-Meehan, as well as other types of brake shoes for various classes of both steam and street railway service. Hereafter the agents of the constituent companies will represent the combined interests, but until further notice, orders are to be sent direct to the several companies as heretofore. The notice is signed by W. W. Snow, president Ramapo Foundry Co., Mahwah, N. J.; W. D. Sargent, president Sargent Co., Chicago, Ill.; Joseph D. Gallagher, president Lappin Brake Shoe Co., Bloomfield, N. J.; J. B. Terbell, president Corning Brake Shoe Co., Corning, N. Y.; Frank L. Gordon, vice-president Streeter Brake Shoe Co., Chicago, Ill.

Some of the noteworthy structures designed by American engineers and in use by railroads and great industrial concerns are pictured with good effect in a folder mail card just issued by the Joseph Dixon Crucible Co., Jersey City, N. J. Attention is called to the fact that these steel structures are protected from corrosion by the use of Dixon silica graphite paint.

James G. Lindsay & Co., dealers in structural iron and steel, Philadelphia, Pa., have moved into their new offices, Nos. 1019, 1020 and 1021 Arcade Building, 15th and Market streets.

Machinery Agencies vs. Direct Selling.

BY "SCRUTATOR."

Although appearances seem to be against me I still think that it is better for a machinery manufacturer to sell his own product. While it is true that there is more machinery now probably being sold through agents than ever it does not follow necessarily that this is the best way to do it, or that it will always be done this way. Simply because a thing is largely done, it does not follow that it is the proper thing to do. For that matter I suppose there is more beer sold now than ever before, but some people think that this is a bad thing instead of a good one.

One reason why I think that it is better for a manufacturer to sell his own machinery, is that the customer usually prefers to deal directly with the maker. Within two weeks I have neard the manager of a large concern bitterly complain because, having sent to a machinery manufacturer for information, this manufacturer, who has always sold through agents, and thinks it is the best way to do, instead of giving him the information as requested, simply turned the matter over to his agent and this agent sent a green young man to see this manager, and the green young man could not give the manager any information that he wanted. Of course the young man could not help being young and for that matter he will, as some philosopher—name at present not recalled—has said, "probably outgrow that fault in time." Within a week I have seen a letter addressed to a machinery manufacturer particularly specifying that the matter should not be referred to an agent, but tne business done direct.

The readers of *The Iron Trade Review* have not heard from me lately, for which some of them will probably be profoundly grateful. One reason why they have not heard from me is because I have been abroad and the reason why I went abroad was that a well-known European machinery agent who had undertaken the agency for a new special American machine, knew enough to know that he did not know anything about this particular machine; and as I happened to know all about this machine, I was engaged by the European agent to go over and do the "missionary work" in connection with the same. It is all well enough just now when business is good, for a man to sell machinery through agents. It is the easiest thing he can do, and no doubt it is the cheapest way he can sell; but in more quiet times it certainly will be a great advantage for a machinery dealer personally to know his customers. Even this concern mentioned above, who are the strongest advocates of any concern that I know of, of the idea of selling through agents, agree with me to the extent that they say they do not propose not to know who their customers are, and more than all that, that they propose to circulate around themselves among their customers for the sake of the acquaintance. So that I do not yet see where their consistency comes in; for while they are circulating around among the users of their machinery, it seems they might as well be doing their own selling.

I have heard of at least one case where a concern which had been doing a good business, selling through agents, woke up one morning to find that its agent had simply dropped it in favor of some other machine, and this is always a possibility.

The agent who sells several makes of machines must necessarily divide his attention and cannot possibly know as much about any particular make of machine as the man who makes it, or what is practically the same thing, some one directly connected with his establishment. I notice that anyhow there is a growing call for men who have been through the shop, to sell machinery. I have myself this very day been put through a long catechism regarding the machines which I am selling, which could not by any possibility have been answered by some agent with a dozen other lines of machinery on his mind. The demands of the machinery buying world are growing more exacting every day. They not only want better construction and workmanship, but they want to know the reason why of the construction and the manner in which the machine is built.

I might keep on in this strain for quite a while yet, but I am afraid the editor will cut out about half of what I have written already.

The Kempsmith Manufacturing Co. and Its Card System.

The Kempsmith Mfg. Co., of Milwaukee, Wis., is a manufacturer of millers for the metal trades; and the writer says "millers" advisedly. Not that these millers are other than milling machines, but the company prefers the term millers and it is used throughout the printed matter sent from the office. If there is anything in mechanical customs to add weight to the practice of naming a machine by the brief title it is to be found in the ready adoption of the words, "planer," "shaper," "slotter," etc., and the remainder of the series of shop tools it is seldom thought advisable to designate by the addition of the word machine. The milling machine therefore may appropriately be called a miller with no fear of misunderstanding and it is frequently so termed in ordinary conversation.

The general rule, however, has its limitations when talking of boring machinery as well as screw machines. The latter class is occasionally subdivided in shop parlance to "automatics" when attention is to be more particularly directed to the advanced type of turret or multiple spindle machines. This distinction is far from being the most satisfactory and there may be a chance here for some one to do for the nomenclature of boring and screw-cutting machinery what the Kempsmith Mfg. Co. proposes to do by example and precept for the milling machine.

The business of the Kempsmith Mfg. Co. has been devoted

NAME John E Smith — TIME CLOCK NO. 34
ADDRESS 59 Howard Street
LAST EMPLOYED BY Hadley Machine Co — LEFT THEM 3/5/99
AGE 30 — MARRIED No — HABITS Good — CHARACTER Excellent
DATE EMPLOYED 3/10/99 — DATE LEAVING 4/6/01 — REASONS Higher wages
WAGES PER HOUR 20¢ — OCCUPATION Lathe hand — DEPARTMENT #4

WAGES								
OCCUPATION	Lathe		Lathe					
INCREASED	DATE 4/6/00	TO PER HR.	DATE 7/2/01	TO 30 PER HR	DATE	TO PER HR.	DATE	TO PER HR.

REMARKS Became foreman for Hadley Mach Co

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FIG. 1.—CARD INDEX TO WORKMAN'S EXPERIENCE AND RECORD.

to the miller and its development in keeping with the trend of machine shop improvements since the establishment of the company in 1888. In the natural growth of the enterprise the plant has been equipped with numberless mechanical devices for the accurate machining and duplication of every piece entering into the construction of a miller. This is carried out to the extent that the smallest screw is produced right at hand in the one factory. The shops exhibit, therefore, an excellent opportunity for the study of the art of milling as of course the miller will have its field best shaped by those well acquainted with the capabilities of the machine. The general utility of the modern type of miller is by no means so well understood as it deserves. The machine is to a remarkable extent considered adaptable only to tool room purposes or the manufacture of duplicate parts. There is a wide scope beyond these limits and the tool is capable, with the regular attachments, of performing an ample range of work at a minimum cost as compared with any other machine tool.

The original founder of the Kempsmith Mfg. Co. was Frank Kempsmith, a mechanic of deservedly high repute. Mr. Kempsmith at one time was in the employ of the Brown & Sharpe Mfg. Co., in Providence, R. I., and afterwards had charge of the shops of Warner & Swasey at Cleveland. Subsequently he went into business at Springfield, O., where he had once been employed as a tool maker. Later he established the plant in Milwaukee, about fifteen years ago, and built up an exceptionally well equipped factory for the production of millers. He retired from all active participation in the business about a year ago owing to his failing sight; one eye having been removed and the other seriously affected doubtless by the sympathetic action. Mr Kempsmith's reputation as an unusually able mechanic was very generally appreciated. He is said to have had the well developed and highly trained faculty of the skilled workman who has the happy and valuable ability to produce a finished piece of work in the most elaborate and painstaking manner and was equally adroit and perfectly competent to get out a product good enough and not too good for the needs of any ordinary occasion. Such men are sufficiently rare even among toolmakers to warrant the mention of this attainment by the founder of the Kempsmith shops.

The present company took charge in February of last year with Mr. C. F. Wieland as vice-president and general manager. The new management is following along the path marked out by the founder and various improvements in the product have been made from time to time which have received attention in the columns of the journals devoted to machinery. About 85 men are employed on day wages and lately the system described in *The Iron Trade Review* of Oct. 10, 1901, has been introduced. This is essentially the method of shop management adopted by the Lodge & Shipley Machine Tool Co., of Cincinnati, and is applicable to shops of various sizes and conditions with but few modifications.

Mr. Wieland has found the card index extremely useful in the successful handling of the office and thoroughly believes in the applicability of this convenience to the lightening of routine labor. The custom of charging the memory with the crowding facts of a live and extensive business is fast becoming out of date and any ready-to-wear appliance that will be other than a misfit in every day use is welcomed by the progressive management of a modern plant. It is an insurance against the forgetfulness of the man who can more profitably use his ability in other directions. The cards in use at the plant of the Kempsmith Mfg. Co. are cut to a uniform and standard size as far as possible and the system of drawers

TOWN Cleveland — STATE Ohio
NAME Smith Machine Co — SIGNED BY Fred Redford
DEALERS CONSUMERS — RATING 20m E — BUSINESS Wood, Wkg. Mchy — STREET ADDRESS 34 Juniper
INQUIRY DATED 2/27/02 — ANSWERED 2/28/02 — SENT CAT. NO. 13 4/20/02 — AGENT REFERRED TO
WANT Background, plain — SAW ADV. IN
EVENTUALLY BOUGHT 7/0/02 — AGENT — REASON
WHOSE MILLER NOW USED Brers — SIZE AND TYPE #24-Univ — SHOP NO. 250 — DATE 2/5/95
MECHANIC IN CHARGE W Woodworth — PREJUDICE FOR — REASON

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FIG. 2.—CARD INDEX TO PROSPECTIVE BUYERS

and files can thus be maintained or extended without impairing the original design of the installation. The size of the cards is 3x5 inches.

Fig. 1 is a reproduction, to a smaller scale of course, of the card index as applied to the record and experience of workmen. The card has been filled out by the writer to show the availability of the method; and the statements are in no sense of the words a duplication of a card taken from the files of the Kempsmith Mfg. Co. It is proper to state here that the other cards submitted have been prepared in a similar way and the matter written on them is but a guide to the actual use of the office system; it being understood that the forms as regards printed matter and general arrangement are facsimile reproductions. Fig. 1 has been found highly useful as an individual history of workmen. It is sufficiently explicit to serve all practical requirements and is at the same time easily handled, as the questions that are most likely to require an answer are covered by the printed matter, and the filling of the blanks necessitates but slight attention or labor. Aside from the benefit of the experience record to the shop in which it is maintained there is the added advantage of a check against any accidental or possibly intentional misrepresentation of the facts when a workman seeks a position elsewhere. A reference of the prospctive employer to the firm where last employed is the usual method of procedure and the off-hand response of a busy man is so frequently inadequate to the occasion that men are taken on trust in many cases rather than hazard a misleading reply to an inquiry. The passing of men through the shop sieve leaves a permanent record at the Kempsmith plant and should there be any need to seek a formr employe—and a man of this class has an acquaintance with the requirements of the shop that would be entirely lacking in a stranger—there is the record and he may be reached if the card should justify his selection.

The cards shown in Figs. 2, 3 and 4 illustrate the method of

following up inquiries, recording sales, etc., by means of the card index. A sale may follow the reading of an advertisement telling of the merits of the goods and the location of the manufacturers; it may come from the introduction of a machine in a shop near the one operated by the inquirer and be the result of some local endorsement of the advantages to be gained by the purchase of a miller of that manufacture, or the order may be derived from the work done by a descriptive catalogue or circular, a form letter, or any other of the various ways in which the modern purveyor reaches out for business.

It is frequently found that a record of the manner in which results have been attained in the sale of goods is exceedingly useful in planning subsequent campaigns and making proper allowance for the expense to cover the most productive method of marketing the manufactured product. The Kempsmith Mfg. Co. uses a series of cards to cover this need and these are printed on stock of various colors to designate the different classes of inquiries, etc. The colors are not yet to be had in

TOWN Cleveland STATE Ohio
USER Smith Machine Co SOLD BY Richards
SHOP NO. | CAT NO. NEW 9 OLD | DESCRIPTION Plain, backgeared | SHIPPED 3/30/02
SPINDLE BORE 1 1/16"
AS EXTRAS HAS #2 A. Univ. Index Centers. EXTRAS SHIPPED 3/30/02
DRAWINGS SERIES NOS.
ALTERATIONS FROM REGULAR
REPAIRS
ALSO HAVE MCHES. SHOP NOS. K #24/250
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FIG. 3.—LOCATION OF SALES BY TOWNS.

sufficient variety to meet the several requirements, but as may readily be seen they cover a number of inquiries successfully and permit of a useful division into easily recognized portions of probable outlets for machinery. For instance, Fig. 2 may be red, denoting that the inquiry came from a railroad, or yellow indicating that the inquiry was the result of seeing an advertisement or other printed matter. The office may, however, introduce the subject to a firm whose address is noted as a probable or possible customer. The colums of *The Iron Trade Review* give considerable space to the prospective buyers of metal working machinery and this list is carefully canvassed and utilized in sending catalogues, etc. The cards for the purpose of tilling this virgin soil are, appropriately enough, of white material.

It will be apparent that Fig. 2 is submitted to show the history of a sale condensed into an easily understood record. The

SHOP NO. | CAT NO. | DESCRIPTION | SHIPPED
340 | NEW 9 OLD | Plain, backgeared | 3/30/02
USER Smith Machine Co TOWN Cleveland STATE Ohio
SPINDLE BORE 1 1/16"
AS EXTRAS HAS | EXTRAS SHIPPED
#2 A. Univ. Index Centers 3/30/02
DRAWINGS SERIES NOS.
ALTERATIONS FROM REGULAR
REPAIRS
ALSO HAVE MCHES. SHOP NOS. K #24/250
THIS MCHE. SOLD BY Richards
THE IRON TRADE REVIEW

FIG. 4.—LOCATION OF MILLERS BY NUMBER.

card will in the first place have a most meagre record of the firm, the name, address, business and commercial rating; but, as the correspondence proceeds, this collection is supplemented. The personal element is not to be ignored even in the rush of modern business and the ability to remember names is a valuable acquisition to the salesman; whether the sale be negotiated by an agent or conducted by correspondence it is an excellent thing to know the name of the man of affairs and the visit to a plant that starts into action with a personal inquiry for the man who handled the correspondence begins with little delay and under mutually favorable auspices. This detail is contained in the card along with the nature of the other requirements.

The outcome of the negotiations is liable to be affected by the individual preference of the man in charge of the department where the new miller is to be put to work. If he has a preference for any other miller or is in favor of the one offered it is useful to learn his prejudice and the reason for his choice. His name while not so important as that of the immediate purchaser is yet of value in making a trip to the department for the purpose of having an inspection of the requirements to be fulfilled by the new machine. The type of miller already in use, its size and age, are not difficult matters to learn and are serviceable in advocating the introduction of millers and attachments most advisable for the work in hand at that particular plant. These items are thoroughly yet concisely covered by the entries in Fig. 2.

The result of the negotiations is seen in the date assigned to the purchase of a Kempsmith miller. If the deal had not had so favorable a termination, the name of the machine eventually bought, and the reason assigned for the selection, could be inserted on the card if circumstances should bring these facts to light. The endorsement of some special reason assigned for the purchase of a Kempsmith machine is worthy of preservation also as a source of reliable reference in the preparation of advertising matter or any similar purpose.

When the trade has been concluded, the sale is recorded in two ways on sets of cards; first, by the shop number of the machine, and secondly, by the location of towns. Fig. 3 shows the location of sales by towns and Fig. 4 gives the location of millers by shop numbers. Both cards contain the same amount of information, but the difference in arrangement permits the two methods of indexing. The number of the machine is a guide to the details of the original sale even if the machine pass through several hands, and any special work or drawings are indicated at once on handling the card. There is chance for a lengthened delay while the time-consuming mail shall permit of an interchange of letters if this information regarding the initial shipment is not at hand and, in addition to this, there is the knowledge of conditions in that plant so that with the advent of any new attachments the circulars may be placed to do the most good. Indexing by towns is especially beneficial when opening up new trade and it is desirable to refer a prospective purchaser to a plant where the machine may be seen in operation; and giving the location by towns enables the neighborhood to be readily scanned and a firm in the immediate locality selected whenever practicable.

A grinder for sharpening blades of clippers, etc., is being introduced by John Van Benschoten, of Poughkeepsie, N. Y. The machine consists of a frame with a horizontal arm and a base. The vertical shaft, between the arm and the base, carries a 14-inch emery wheel and turns on a cone bearing. Power is transmitted by belt and pulley. The upper surface of the emery stone has a circular depression 4 inches in diameter. On the remaining 5 inches of the stone the blades of clippers are held parallel and moved laterally, to maintain the surface of the stone flat and true. The machine has a special truing attachment, consisting of two ½-inch rods fitted in supports on which is an emery wheel dresser. This arrangement permits the stone to be trued absolutely and the glaze to be removed without taking the shaft from its bearing. In operation the dresser is moved gradually across the surface of the stone by means of a small crank and a screw. In addition to the work mentioned, the grinder is adapted to such light surfaces as dies and cutter knives.

At a meeting of the stockholders of the Pennsylvania Furnace Co., held at Philadelphia last week, it was decided to place the company's properties on the market and a committee consisting of T. Hopkins, John Reed and W. M. Deen was appointed to consummate a sale if possible. The reason assigned is that there is not sufficient working capital on hand to operate the furnaces.

The John S. Worthington Co., 1528-30 Wazee street, Denver, Col., John S. Worthington, manager, was reorganized on Feb. 1, G. W. Skinner, Sr., purchasing a half interest. The company carries on business as iron and steel merchants and special agents, selling only to the jobbing trade in all jobbing centers from the Missouri River to the Pacific Coast.

A DAY IN HAMILTON, O., MACHINE SHOPS.

Hamilton, O., has a population of from 30,000 to 45,000 according to the varied estimates submitted to the inquirer, though the census for 1900 shows exactly 23,914. The city contains a number of large organizations devoted to the manufacture of safes, vault doors and fittings for banking institutions. The reader will be more interested, however, in the shops making metal working machinery and engines, and these are a notable feature. Here is located the home of the Hamilton Corliss engine, and the plant of the Hooven, Owens & Rentschler Co. is admirably situated so far as railroad facilities are concerned, sidings and tracks being laid into the plant from both the C. H. & D. and the Pennsylvania railroads. The plant covers two blocks of ground, the foundry being 267x80 feet, constructed of steel, brick and glass. This building is equipped with three 25-ton traveling cranes, a convenience which will be the better appreciated if due allowance is made for the fact that the firm handles the castings for fly wheels, which in their built up form weigh one hundred or more tons. Many fly wheels are cast whole and then broken in two by wedges on the foundry floor, the inequalities of the broken joints serving as an excellent dowel when the two halves are united to form the finished fly wheel. To the casual observer this method of wedging asunder the two parts of the wheels would appear to be liable at any time to force out a third piece at one of the points of separation. This piece need not be large and yet it would form an ugly gap in the wheel when assembled. This writer was assured that this result is very unlikely but would mean another casting, as no attempt would be made to patch such a flaw. In practice the method produces a good clean fracture, sufficiently undulating to hold against any side slip when bolted and at the same time make a nice close joint in turning up the face of the wheel. Grooved wheels for rope drives are made the same way with equal safety.

The two machine shops have each a supply of traveling cranes, of 25-tons capacity, electrically driven. The shops are 40x300 feet and contain some heavy tool equipment, one of the boring mills having a capacity for turning a fly wheel 24 feet in diameter and 100 inches face. There is also a cylinder boring machine capable of boring the barrel and the four ports and face off the ends of a cylinder at the one operation and, of course, the one setting of the work, thus bringing the several parts in close alignment and proportion. A large hydraulic press is provided for pressing on the shafts, cranks, crank pins, wheel centers, etc. This is a horizontal machine of 400-ton capacity, the pump being driven by electric motor.

The pattern shop is fully equipped with modern tools and is a five-story building, 50x80 feet. The warehouse is of fire proof construction, 60x100 feet. The manager is Mr. J. A. Vail, who formerly represented the company in St. Louis, Mo.

A plant having a capacity of a Corliss engine every working day is no small affair, but the Hamilton establishment is destined for a number of important changes. It is proposed to triple the capacity of the plant, which now employs some 300 workmen. A number of buildings are to be erected immediately and the company will probably go more thoroughly into central station equipment, vertical engines and other developments of modern steam engineering in its heavier applications. The new foundry is to be 408x110 feet. Three new shops will be proportioned as follows: Two 275 feet wide and one 40 feet, each to be 400 feet long and 55 feet high. Contracts call for six 50-ton cranes, which will bring the number up to eleven. This heavy crane capacity will not be excessive in view of the fact that a mounted shaft weighing 120,000 pounds is no rarity. Among the new planers will be a 12x12x30-foot machine. The average barn door does not come anywhere near the cross-sectional dimensions of the block of metal this planer would handle with ease.

Standard sizes and a close adherence to the dimensions prescribed by the designer is a characteristic of the shop routine, but necessarily there may be a variation at some place or another in work. The diameter of a cylinder, the length or depth of a crosshead, etc., may be slightly changed with little or no influence upon the machine. If the engine should at some time need repairs the shop must trust to the luck which does not always accompany work of that kind and follow the old drawings irrespective of the slight changes that may have been expedient during the original construction of the ma-

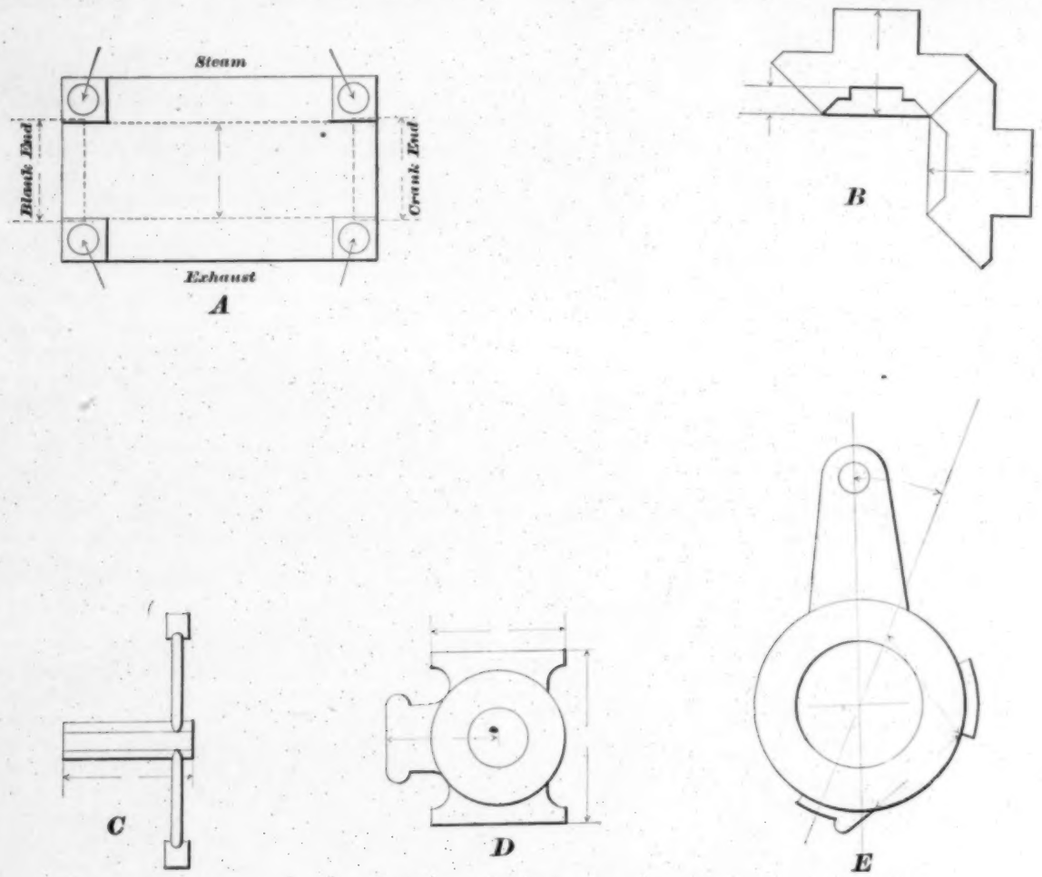


FIG 1.—DETAILS OF STEAM ENGINE RECORD.

chine. The variation may be caused by a superficial flaw in the casting, a little sand or blow hole, that may be removed by enlargement of the bore, etc. Whatever the change may be, or the extent of the interference, it should be on record and here is where the average shop may fall by the way. Every order on the books of the Hooven, Owens & Rentschler Co. has a page assigned to it in a journal kept by the superintendent. Here are compiled the data of importance: whether right or left-handed, simple or compound, condensing or otherwise, etc., a good deal of the work of recording being simplified by a careful arrangement of the page, as a printed form, requiring a minimum of labor to fill in the blanks. It is very evident that a rough sketch can easily be made by a practical man, but the drawing may be too rough for neatness and its value will be lessened by the want of care that may be taken in its preparation. Furthermore it is becoming more and more apparent that the keeping of books in engineering establishments must partake of the characteristics of the machinery found in these plants; it must be as nearly as possible of an automatic type moving on straight lines and ways accurately and with little or no dependence upon the personal peculiarities of the human factor.

The Hamilton Corliss people have therefore a set of five rubber stamps capable of making the impressions shown in Fig. 1. The cylinder seen at A has dimension lines arranged for the sizes of counterbores at head and blank ends, the bore of cylinder as well as that of the inlet and exhaust ports. B will show the length of hubs on governor gears as they may be changed

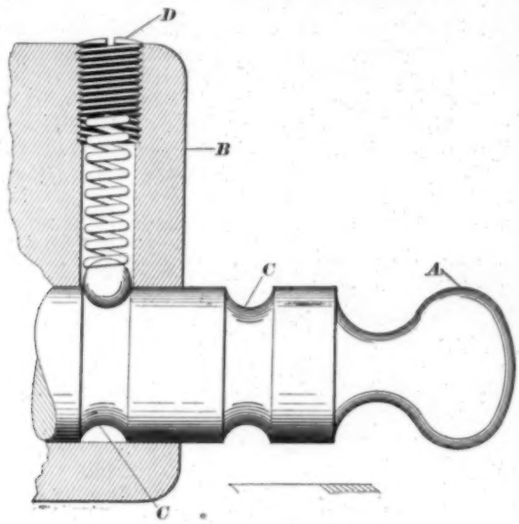


FIG. 2.—LOCKING DEVICE ON LATHE.

by the depth of boss on the frame, etc. The length of governor arm hub may be shown by C; the various dimensions of the crosshead can be noted on D, while the angles and trip of the governor toe collar can be recorded on E. The handling of shops is not invariably in the hands of men who are expert with pen or pencil, and this method of keeping track of highly important data may suggest a further extension of the idea into other lines of machine manufacture than engine work, where the quantity does not call for strict interchangeability.

The Niles Tool Works are also situated in Hamilton but a short distance from the Hamilton Corliss plant. These works have frequently been mentioned and described at length in various publications and the writer had considerable curiosity regarding them. Their extent is somewhat surprising when compared with the size of the town in which they are located and the proximity of other large shops. Some fifteen acres of floor space is under roof and about 1,800 men are employed. Machine tools of remarkable size and capacity are the rule rather than the exception among the work in course of construction. The heavy tools of the Hooven, Owens & Rentschler Co. already mentioned were made here and the later equipment ordered for the new plant will be built by the Niles Tool Works. The work in process of manufacture and erection is of sufficient magnitude to impress one with the extreme limits that the plant can handle successfully. For example, a screw was being cut on the installment plan as no available machine would take a chip from end to end at one continuous operation. The screw in question was 100 feet long and 6 inches in diameter and was intended for a 96-inch lathe for the Midvale Steel Co. This lathe was designed for roughing cuts on heavy shafting, marine engine forgings, etc. The forging, straightening, turning and threading of 100-foot screws is a fair suggestion of the capabilities of the Niles Tool Works. The plant has long outgrown the original site and the shops have spread over intersecting streets. It would seem impossible to parallel the crowded condition of the erecting floor in any other establishment of a similar kind. Here and there one machine has been lifted bodily onto another, a lathe standing on a planer bed for instance, but there appears no likelihood of relief unless the plant pushes out beyond its present limits and builds anew.

The Hamilton Machine Tool Co. is another thriving industry employing about 180 workmen on engine lathes, drill presses and radial drills. The shop is modern and thoroughly equipped with up-to-date conveniences. The tools are manufactured in lots of 50 to 100 at a time. The radial drills have the stump extended up to the end of the sleeve where the load is taken by a ball bearing. The retaining surfaces for the balls can be of smaller diameters at the top of column than if they were placed at the base of the sleeve and they are of course more easily hardened and finished with accurate surfaces in the compact form. The company has applied another form of ball bearing to a lathe feed which is of interesting design. Contrary to the commonly accepted purpose of ball bearings, this arrangement is intended to check or lock the motion of two sliding surfaces when the required point has been reached. This device is shown in Fig. 2; A being the handle at the end of a sliding rod which passes through the casting B. A couple of grooves CC are formed in the rod A, a hole is drilled and tapped at D and provided with a ball, spring and screw plug (oiind screw) as illustrated. The grooves CC in the rod A extend something less than half way around the ball and the pressure of the spring on the latter can be nicely regulated by the screw at D. When A is forced in the direction of the arrow, the ball rises out of the slot at the necessary pressure to again fall into the other groove when it is reached and the pressure requisite for releasing the arrangement can be but a trifle more than what may normally come upon the end of the rod A when in use retaining gears in position. The general application of a locking device to feed or change gears is parallel with the axis of the stud supporting a gear and this position is much less liable to cause the rod A to move endwise. The particular purpose to which this device is applied is of such a character that the end thrust is practicably negligible and therefore the spring in Fig. 2 needs to exert but a very delicate pressure upon the locking ball to be thoroughly effective. The lathe having this device had an excellent equipment of lubricating facilities. It seems one of the most peculiar instances of the survival of the unfit that oil holes should be uncovered to the grit and grime of the ordinary working conditions of the machine shop. In the present case the holes were stopped by a plug pressed upward by an internal spring. The nozzle of the oil can pushed down the plug to one side of the chamfered hole and, after the application of the lubricant, the opening was automatically closed on removing the pressure from the plug. Altogether a sightly, cleanly and convenient method of lubricating machine tools. R. I. C.

The Republic Iron & Steel Co. has just issued from its general offices at Chicago a hand book of its products which supersedes all other catalogues and lists. It consists of 250 pages, 5½x7⅞ inches, bound in flexible leather. Finger indexes on the margin make ready reference to particular products easy. The catalogue is at once a complete hand-book of the products of the Republic company, and a compendium of information as to sizes, weights, sections and other detailed data of merchant iron and steel, special shapes, rail fastenings, shafting, spikes, sheets, plates, nuts, bolts, etc. A department of the book is given up to lithographs of sections of the various agricultural and other special shapes manufactured by the company. The annual capacity of the 20 mills listed in this catalogue is 1,000,000 tons of finished material. The volume gives an impressive idea of the detail attaching to the products of the company and furnishes information of value to all who use them.

AN OIL SAVER.

The device herewith illustrated in two different forms for economically applying oil to working parts, is reputed to have had its origin in an operating department of pronounced wastefulness, and originally provided for the oiling of mine car wheels; but its accredited benefits adapt it to the various classes of mining and other machinery and to general manufacturing where lubricants are required. A saving of as great as 50 per cent in labor and oil is reported to have followed its adoption in some of the larger coal mining properties. The

TORMAY PATENT OILER.

Ironsides improved Tormay patent oiler herewith shown is the product of experience, former inherent weaknesses being eliminated and improvements adopted as suggested by the more experienced users. The oiler consists of a central working barrel, containing a plunger and surrounded by an oil reservoir. Openings in the working barrel, sealed or unsealed, according to position of plunger, communicate with the oil reservoir. The adjustability of the stroke of plunger governs the quantity of oil forced each operation. When not in use the contents are preserved from leakage and protected from dust and other impurities. The Ironsides Co., Columbus, O., manufactures this oiler.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market and Some of their Wants:—

The O'Neill Tool Co., of Peoria, Ill., has been incorporated with $2,500 capital to manufacture tools and machinery. F. J. Quinn, Richard and Joseph O'Neill.

The Nickelson Foundry Co., of Chicago, has been incorporated with $25,000 capital to operate a foundry and machine shop. W. A. Treat, E. L. Bowser and S. T. Nickelson are the incorporators.

The American Foundry & Machine Co., of Hanover, Pa., has been organized by the election of the following directors: T. M. Brown, David McG. Newcomer, Dr. J. H. Bittenger, H. N. Git and A. R. Brodbeck.

The Jordan Mfg. Co., of Tacoma, Wash., will erect a nut and bolt plant at that place and will shortly place orders for nut and bolt machinery.

Ground has already been broken for the erection of the new plant of the Superior Chain Co., at Marysville, Pa. The plant will contain forty fires and a large amount of chain machinery will be purchased.

The Northern Metal Co., of Chicago, Ill., has been incorporated with $10,000 capital. William Pasimenski, Jacob Pasimenski and Ralph Lipsey are the incorporators.

The Ideal Machine Co., of Sioux Falls, Ia., has been incorporated with $150,000 capital. J. B. Hilton, R. L. Stanton and Oscar Nelson are the incorporators.

Charles D. Stucker and B. W. Demming are promoting a chain manufacturing plant at Harrisburg, Pa., which is to be capitalized at $50,000.

The Empire Iron & Steel Co., of Niles, O., incorporated with $200,000 capital to erect a sheet mill at Niles—W. A. Taylor, John O'Dea, Charles S. Thompson, D. Strickland and W. H. Smiley, incorporators—has let the contract for the erection of the buildings to the American Bridge Co.

The citizens of Worthington, Ind., have been asked to contribute a bonus of $60,000 for the erection of a sheet and tin plate mill in their town, the company to invest $300,000.

The McKercher Wrench & Tool Co., of Jackson, Mich., has been incorporated with $30,000 capital for operating a plant to manufacture wrenches. The company is now in the market for machine tools and approved machinery to be used in wrench manufacture. Robert Lake is president; H. S. Griggs, vice-president; H. U. Ulrickson, secretary; George Hastings, treasurer, and George McKercher, superintendent.

The Metalware Mfg. Co., of Louisville, Ky., has been incorporated with $20,000 capital. W. T. Hale, J. J. Morris and G. G. Summers are the incorporators.

The Mainland Mfg. Co., of Indianapolis, Ind., has been incorporated with $50,000 capital to manufacture engines. A plant will be erected near Indianapolis. O. F. Watson, D. M. Demey and W. J. Taylor are the incorporators.

The Globe Iron Works, of Minneapolis, Minn., has been incorporated with $200,000 capital to operate a plant for the manufacture of gasoline engines and machinery. C. O. White, E. J. Kimball, M. W. Matteson, C. S. Langdon and E. F. Bousfield are the incorporators.

The Niles Sheet Metal Lath Co., of Niles, O., has been incorporated with $200,000 capital to operate a plant for the manufacture of sheet metal lath. Wade A. Taylor, C. S. Thomas, W. T. Holzbach, F. W. Stillwagon and John F. O'Dea are the incorporators. This plant will be operated in conjunction with the Empire Iron & Steel Co., of the same place, recently incorporated.

The Huntington Tin & Planished Plate Co., of Huntington, W. Va., recently incorporated with $50,000 capital, will break ground shortly for the erection of its plant. The company is now in the market for considerable machinery.

The Brunswick Steel & Iron Co., Brunswick, Ga., has been incorporated with a capital stock of $50,000, with privilege of increasing to $5,000,000. The company will manufacture iron and steel. The incorporators include Frank P. Brooks, New York, N. Emanuel, J. J. Lott, C. D. Ogg, Albert Fendig, and others.

The Duluth Gas Engine Works, Duluth, Minn., has been reorganized and its plant will shortly be started up again. The following were elected officers for the following year: President, A. A. Williams; vice-president, G. W. Johnson; secretary and treasurer, William Tilderquist.

The Cedar Creek Manganese Co., Woodstock, Md., will install modern machinery for the development of its 2,000 acres of manganese lands, recently acquired. J. W. Galloway, Baltimore, Md., may be addressed.

The Norton Engine Co., Odebolt, Ia., has been incorporated to manufacture a rotary engine. Capital stock, $150,000.

The Cedar Rapids Foundry & Machine Co., Cedar Rapids, Ia., has been incorporated with a capital stock of $25,000. Joseph Cockfield, president and treasurer; D. B. Getty, vice-president and secretary.

Richards Machine Co., Atlanta, Ga., is in the market for complete machine shop outfit.

Union Iron Works, Selma, Ala., wants prices on 50 water tight galvanized drums, 18 inches in diameter, 10 feet long, shells of No. 14 and heads of ⅛-inch material, dished, eye bolt in each end made of ½-inch round iron; also on 100 galvanized sheets No. 14, 57¾x61 inches; 100 galvanized heads, ⅛-inch thick, flanged 18 inches in diameter, dished.

Winslow Ballot Machinery Co., Kansas City, Mo., will shortly require small screw machines, light milling machines, lathes, presses and full machine shop equipment.

Surry Lumber Co., Dendron, Va., wants a second hand power pipe-cutting and threading machine, six to nine inches capacity.

Green County Oil Co., Union Point, Ga., is in the market for conveying machinery, shafting, pulleys, hangers, etc.

The Eureka Steel Range Co., O'Fallon, Ill., has been incorporated with a stock of $5,000 to manufacture stoves and ranges. The incorporators are William G. Willard, August A. Willard and William G. Willard, Jr.

The White-Newberry Machine Co., Raleigh, N. C., has been

incorporated with a capital of $5,000, to manufacture and repair machinery. N. K. White is president, and J. F. Newberry, secretary and treasurer.

Chappuis Co., Rayne, La., wants to purchase second-hand Corliss engine, 20 to 24x42 to 48, with rope drive. State make, age, weight, right or left hand.

The Richmond Foundry & Machine Co., Richmond, Va., has been incorporated by J. Scott Parrish and Arthur Scrivenor.

The Waterloo Gasoline Engine Co., Waterloo, Ia., has increased its capital stock from $20,000 to $40,000.

N. D. Kain, of Covington, Ky., has been at work on the organization of a rolling mill company. The plans call for an 8-inch and a 12-inch guide mill and a 24-inch plate mill.

The California Industrial Co., of Los Angeles, Cal., has been figuring on the erection of a rolling mill. C. E. Benedict has been in Pittsburg recently negotiating for machinery.

The Reeves Engine Co., of Trenton, N. J., recently incorporated with $400,000 capital, has just organized by the election of Clifton Reeves, inventor of the Reeves compound engine, as president; Wm. M. Muschert, vice-president; A. C. Reeves, secretary of the Trenton City Bridge Co., treasurer; Wm. A. Buckman, secretary. The executive committee is made up of A. C. Reeves, Owen Moore, Jr., and R. H. Reed. The Reeves Engine Co. took possession of the plant and appliances of the old company on April 1, and will very materially increase its capacity by the erection of new buildings, and the installation of additional machinery. An office and sales department will be established at once in New York and later the company may start branch offices in other large cities.

The Westmoreland Steel Co., Pittsburg, is in the market for a hot saw for cutting hot steel billets and bars and also a single leg trip hammer of 1,500 to 2,000 pounds capacity.

The Rockwood Mfg. Co., of Indianapolis, Ind., has been incorporated with $20,000 capital for the purpose of manufacturing machinery. William E. Rockwood, George O. Rockwood, W. M. Rockwood and A. W. Hatch are the incorporators.

The New Castle Shovel Co., New Castle, Pa., has been incorporated with $20,000 capital.

At a meeting of the stockholders of the LaBelle Iron Co., of Steubenville, O., held at Wheeling last week the capital stock was increased from $3,000,000 to $5,000,000. The increased capitalization will provide for extensive improvements outlined in these columns some time ago.

The Northwest Mfg. Co., of Toledo, O., has been incorporated with $20,000 capital for the purpose of manufacturing a boiler tube cleaner. George W. Gargen, W. H. Howe, W. H. Sance, H. W. Miller and W. M. Edison are the incorporators.

The DeCamp Bros. & Yule Iron, Coal & Coke Co., of St. Louis, Mo., has been incorporated with $300,000 capital.

The Missouri Bridge & Iron Co., of St. Louis, Mo., has been incorporated with $30,000 capital. J. T. Garrett, R. P. Garrett and James Garrett are the incorporators.

The Empire Wire Co., of New York, has been incorporated with $100,000 capital. S. H. P. Pell, C. M. Harrison and R. T. Garrison are the incorporators.

The Strong Machinery & Supply Co., of New York, has been incorporated with $50,000 capital. C. E. Strong, A. J. Wise and F. V. Haas are the incorporators.

New Construction:—

The Malleable Iron Range Co., Beaver Dam, Wis., at its annual meeting, decided to erect larger buildings and otherwise increase the capacity of its plant.

The Great Northern Railway is reported to have had plans prepared for the construction of five new buildings in connection with its shops at St. Paul, Minn. The plans include a machine shop 150x600 feet, boiler shop 235x425 feet, general store house 100x452 feet, power house 30x103 feet, and storehouse 100x200 feet. The buildings throughout will be constructed of concrete and steel, and will have a foundation of concrete on piles.

The Standard Steel Co., Burnham, Pa., will erect a new foundry adjoining their open-hearth plant. The plant will consist of two buildings each 90x300 feet.

The Kerr-Murray Co., Ft. Wayne, Ind., is erecting a new pattern shop 80x120 feet.

The Bond Steel Post Co., Adrian, Mich., will erect a new building for the manufacture of steel posts. A large amount of machinery used in the construction of these posts will be installed.

The Warren City Boiler Works, Warren, O., is erecting an addition to its plant, 36x100 feet.

The Taylor Iron & Steel Co., Flemington, N. J., will erect a 200-foot addition to its plant.

The plant of the O. S. Kelly Mfg. Co., Springfield, O., will be removed to South Milwaukee, Wis., where an admirable site has been secured. Plans are now being perfected for the erection of the plant. They include a foundry, machine shop, boiler house, power plant and a number of other buildings. The company manufacturers threshers, road engines and iron and steel specialties.

The main building of the Johnston Frog and Switch Co., Chester, Pa., is being doubled in size and when completed will be 110 feet long and 160 feet deep.

The Terre Haute & Indianapolis Railway will shortly commence the erection of a new machine and repair shop, 70x120 feet, at Logansport, Ind.

The Johnson Machine & Foundry Co., Battle Creek, Mich., will build an addition to its plant.

The Deming Co., Salem, Ohio, is preparing plans for an addition to its foundry, 60x80 feet.

The Southern Pacific Railroad has awarded contract to the American Bridge Co. for the erection of its proposed shops at El Paso, Tex. The building will be 120x250 feet, and will be equipped with traveling cranes, etc.

The Smart Heating Co., Fulton, Ky., will establish a plant at Memphis, Tenn., for the manufacture of its patent boilers and apparatus for steam and hot water heating.

The Battle Creek Iron Works Co., Ltd., Battle Creek, Mich., will build a foundry and machine shop.

The Des Moines Automobile Co., Des Moines, Ia., will erect a two-story factory, 44x132 feet.

Better progress has been made lately with the new work of the Sharon Steel Co., Sharon, Pa., owing to better deliveries of structural material. Most of the buildings for the skelp and pipe mills are erected and a considerable portion of the machinery installed. The company is actively at work on all the remaining new construction, including its Otto-Hoffman ovens, four additional open-hearth furnaces, sheet mills and the new blast furnace.

The Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., is erecting buildings at its Red Mountain mines, in which will be installed new and larger compressors, hoisting machinery and boilers; also warehouse for containing tools and repair machinery.

The Pittsburg District:—

J. H. Hillman & Son, dealers in ore and coal lands, pig iron, etc., formerly located in the Empire Building, have removed to 723 and 724 Frick Building.

The Pittsburg Construction Co. has recently secured a number of contracts for the erection of large shop buildings. The contract for the erection of the new plant of the General Fireproofing Co., Youngstown, O., was awarded this company, while the erection of an addition to the plant of the A. Garrison Foundry Co., South Side, Pittsburg, will be done under their supervision.

The Riter-Conley Mfg. Co. has been awarded the contract for the erection of eight steel smoke stacks, each 10 feet in diameter and 200 feet high, by the Colorado Fuel & Iron Co. The stacks will be erected at Pueblo, Colo.

The Pittsburg Steel Construction Co. has been awarded the sub-contract for the erection of the structural steel work of the buildings of the Westinghouse Machine Co.'s foundries at Trafford Park, Pa.

The first annual convention of the Pennsylvania Retail Hardware Dealers' Association was held in Pittsburg last week. The convention closed with a banquet at the Monongahela House. Officers for the ensuing year were elected as follows: G. L. Moore, president; G. J. Rudolph, vice-president; B. A. Maggini, treasurer; J. F. Fry, secretary; executive committee, A. Q. Casselberry, E. E. Lyon, C. N. Savage, B. A. Maggini and C. O. Shroyer.

The plant of the Homestead Valve Mfg. Co. has been removed from Wood street, Pittsburg, to Homestead. Fred Schuchmann is president of the company. The new plant is

much larger than the former one and the output will be materially increased.

The erection of the plant of the National Bridge Co. at Colonia, Pa., has been temporarily suspended, owing to the death of one of the leading financial men back of the proposition. The report that the erection of the plant has been abandoned is officially denied.

The Occidental Smelting Co., of Seattle, Wash., is considering the erection of a large electric smelting plant in the Pittsburg district. It is the intention of the company to expend about $800,000 in the erection of the plant.

The 60,000 mark has been passed by the Pressed Steel Car Co., of Pittsburg, in the manufacture of pressed steel cars. The company's output up to March 27, 1902, aggregated over 60,000 finished cars, or sufficient to make a solid train of cars 360 miles long. The cars built by this company have practically revolutionized the present methods for freight car transportation, the pressed steel car being much lighter in proportion to the carrying capacity than the old style wooden cars in use prior to 1897. The works of the company are pushed to their fullest extent, delivering over 100 finished cars per day, in addition to a large number of trucks, bolsters, center plates, and other pressed steel specialties for wooden and steel cars.

The annual meeting for the stockholders of the Pittsburg Feed Water Heater Co., Pittsburg, Pa., was held last week and the following officers for the ensuing year were elected: James Bonar, president; J. E. Schlieper, treasurer and general manager, and Joseph Cawley, secretary. The company reports a large business for the year just ending on both the open and closed types of heaters.

D. Lamond & Son, engineers and contractors, Ferguson Block, Pittsburg, Pa., have received an order from the Ashland Iron & Mining Co., Ashland, Ky., for remodeling the first of four Whitwell four-pass fire brick stoves. They will be raised to 75 feet high and relined as C. H. Foote patent two-pass stoves for which D. Lamond & Son are the sole agents.

Jones & Laughlins, Ltd., South Side plant, Pittsburg, Pa., was damaged to the extent of $15,000 by the storm which blew over the city on Sunday last. A large number of stacks were blown down necessitating the shutting down of one of the departments temporarily.

The Union Steel Co. recently placed the contract for its blooming mill with the Mackintosh, Hemphill & Co.

General Industrial Notes:—

The Springfield Boiler & Mfg. Co., Springfield, Ill., has been awarded a contract for 26 boilers with a capacity of 15,000-h. p. by the Electric Lighting & Power Co., of St. Louis, Mo.

The Danville Rolling Mill, at Danville, Pa., has been leased from the creditors of C. R. Baird, of Philadelphia, by James Mallon & Co., and will shortly be placed in operation. The two departments, puddle and rolling mill, will give employment to several hundred men.

The puddlers of the Reading Iron Co., Reading, Pa., have asked for an advance of 50 cents per ton. They are now receiving $4 and have asked their employers to answer by April 7.

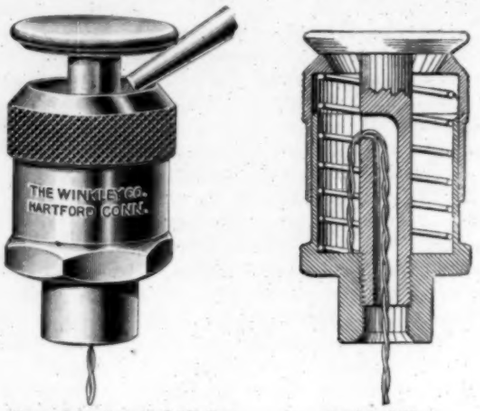
The Grand Rivers Furnaces, Grand Rivers, Kv., which have been idle since 1892, were blown in last week. The furnaces were designed to use charcoal as fuel, but this has been changed to coke, inasmuch as valuable coal land has been found in the vicinity of the furnaces which makes good furnace coke. The new company which now operates the furnaces was organized about a year ago and consists of John W. Harrison, president, and E. H. Simmons, vice-president and treasurer, of St. Louis, Mo. Thomas J. Scott is manager of the furnaces. They have an annual combined capacity of 45,000 tons.

J. J. Ryan & Co., 68-74 W. Monroe street, Chicago, report receiving contracts for the metal trimmings for marble closets and urinal partitions and lavatory work for the following buildings: Auditorium Annex, Hoyt Building and Rookery Building, Chicago; Grand Opera House, Cincinnati; Peoria Hotel and the Rock Island depot, Peoria, Ill.

At a meeting of the directors of the Dominion Iron & Steel Co. held last week at Montreal, Canada, it was decided to declare a semi-annual dividend of 3½ per cent, payable on April 7.

THE WINKLEY RESERVOIR OIL CUP.

The Winkley Co., Hartford, Conn., manufacturer of oiling devices and a number of styles of oil cups, has lately brought out the new self-closing, constant feed reservoir oil cup, which is illustrated below. This cup is furnished to be either driven or screwed into position. It can be opened by depressing the milled ring by the fingers or by the spout of an oil can, as shown in the cut. When released the cover is immediately



Opened by Spout of Oil Can. Sectional View.

NEW WINKLEY RESERVOIR OIL CUP

closed by the spring, shown in the sectional cut. As will be seen in the sectional cut, the oil cup contains a reservoir, the outlet of which is near the top, and the oil is fed either by wire or wick, giving a constant feed until the cup is empty. This cup is changed into a grease cup by the makers by locating the outlet at the bottom of the reservoir. With the outlet in this position it is also suitable for taking a liberal amount of oil for immediate discharge or for filling with wool to hold back too free discharge of oil. It is substantially made and is furnished either in brass or nickel-plated. The Winkley Co. considers it the best of its many oiling devices.

Pittsburg Machinery for Steel Works at Monterey.

For several weeks large consignments of steel works machinery have been made to the Cia Fundidora de Fierro y Acero de Monterey, Monterey, Mex., of which William White, Jr., Pittsburg, Pa., is the consulting engineer, and the United Engineering & Foundry Co., the contractors for machinery. Fifteen car loads of the heaviest type of steel works equipment have been forwarded, and at least fifteen additional cars will be shipped within the next month. The aggregate weight of these shipments is about 2,000,000 pounds, there being a 44-inch blooming mill with tables, approach tables, manipulator, rail straightening presses, cambering machine and roll lathes. All are of the most modern design. The building of this steel plant marks a new era for Mexico. The new plant will roll rails, structural material and plates.

The machine shop and foundry of the Davis-Walker-Cooper Co., Youngstown, O., will be placed in operation in about 60 days. The new company will manufacture rolling mill machinery and general rolling mill equipment. The machine shop is 40x100 feet and the foundry 60x150 feet. The company was recently incorporated with $50,000 capital.

We are advised that no definite action has been taken by the creditors of the Continental Iron Co. on the improvement of the Wheatland, Pa., rolling mill. An item in the daily press stated that it had been decided to build four heating furnaces, a universal plate mill and several finishing mills at a cost of $200,000.

The Forsythe Pattern Co., of Youngstown, O., has purchased the American Can Co.'s property along Crab Creek, north of the city. There are about two acres of land and a main building 350 by 56 feet. The Forsythe Pattern Co. will be incorporated shortly under the laws of the State of Delaware with a capital stock of $100,000.

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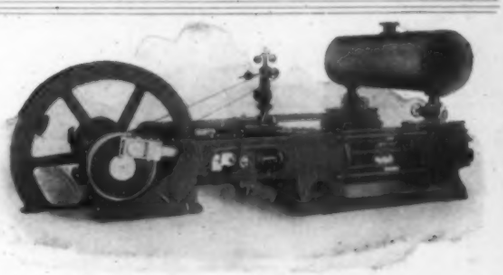

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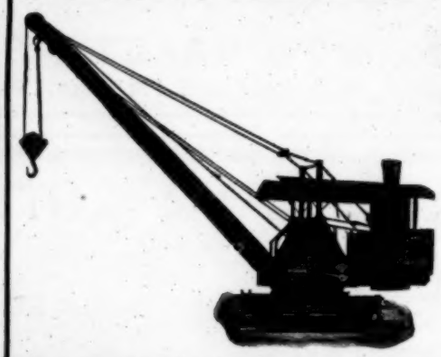

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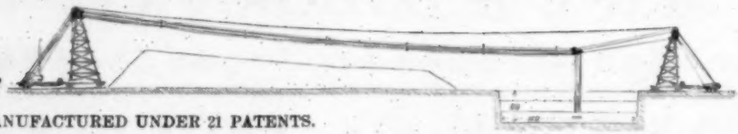

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